This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

DEPARTMENT OF THE INTERIOR
FRANKLIN K. LANE, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

Water-Supply Paper 411

SURFACE WATER SUPPLY OF THE UNITED STATES

1915

PART XI. PACIFIC SLOPE BASINS IN CALIFORNIA

NATHAN C. GROVER, Chief Hydraulic Engineer
H. D. McGLASHAN and F. F. HENSHAW, District Engineers

Prepared in cooperation with
THE STATE OF CALIFORNIA

WASHINGTON
GOVERNMENT PRINTING OFFICE
1918

Digitized by Google

Digitized by Google

635 858

CONTENTS.

	Page.
Authorization and scope of work	9
Definition of terms	10
Convenient equivalents	11
Explanation of data	13
Accuracy of field data and computed results	15
Cooperation	16
Division of work	16
Gaging-station records	17
Tia Juana River basin	17
Tia Juana River near Nestor, Cal	17
Cottonwood Creek near Dulzura, Cal	18
Dulzura conduit near Dulzura, Cal	21
Sweetwater River basin	23
Sweetwater River near Descanso, Cal	23
Sweetwater River near Dehesa, Cal	24
San Diego River basin	27
San Diego River at diverting dam, near Lakeside, Cal	27
San Diego River at Lakeside, Cal	30
San Diego River near Santee, Cal	33
San Diego River near San Diego, Cal	35
Boulder Creek at Cuyamaca reservoir, near Julian, Cal	36
Boulder Creek at mouth, near Lakeside, Cal	38
San Diego flume at diverting dam, near Lakeside, Cal	40
San Diego flume near Lakeside, Cal	41
South Fork of San Diego River near Alpine, Cal	44
South Fork flume near Alpine, Cal	45
San Vincente Creek at Foster, Cal	47
San Dieguito River basin	48
Santa Ysabel Creek near Santa Ysabel, Cal	48
Santa Ysabel Creek near Mesa Grande, Cal	49
Santa Ysabel Creek near Ramona, Cal	51
San Dieguito River at Bernardo, Cal	52
Black Canyon Creek near Mesa Grande, Cal	54
Temescal Creek near Almond, Cal	54
Guejito Creek near Escondido, Cal	56
West San Pasqual ditch near Escondido, Cal	57
Santa Maria Creek near Ramona, Cal	59
San Luis Rey River basin	61
San Luis Rey River near Warner Springs, Cal	61
San Luis Rey River near Mesa Grande, Cal	63
San Luis Rey River near Nellie, Cal	64
San Luis Rey River near Pala, Cal	65
San Luis Rey River at Bonsall, Cal	67

Digitized by Google

Gaging-station records—Continued.
San Luis Rey River basin—Continued. Page.
San Luis Rey River near Oceanside, Cal. 68
Agua Caliente Creek near Warner Springs, Cal. 69
Canada Verde Creek near Warner Springs, Cal. 70
West Fork of San Luis Rey River near Warner Springs, Cal. 70
Carrizo Creek near Warner Springs, Cal. 72
Susanna Creek near Warner Springs, Cal. 74
Matagual Creek near Warner Springs, Cal. 76
Escondido Mutual Water Co.'s canal near Nellie, Cal. 78
Santa Ana River basin. 92
Santa Ana River near Mentone, Cal. 92
Pacific Light & Power Corporation's canal and Greenspot pipe line near Mentone, Cal. 95
Mill Creek at Forest Home, Cal. 97
Lytle Creek near San Bernardino, Cal. 99
San Antonio Creek near Upland, Cal. 100
San Gabriel River basin. 102
San Gabriel River near Azusa, Cal. 102
Pacific Light & Power Corporation's canal near Azusa, Cal. 105
Los Angeles River basin. 107
Arroyo Seco near Pasadena, Cal. 107
Santa Ynez River basin. 108
Santa Ynez River near Santa Barbara, Cal. 108
Santa Ynez River near Lompoc, Cal. 110
Salinas River basin. 112
Arroyo Seco near Soledad, Cal. 112
Alameda Creek basin. 114
Alameda Creek at Sunolglen, Cal. 114
Spring Valley Water Co.'s aqueduct near Sunolglen, Cal. 116
Kern River basin. 117
Kern River near Kernville, Cal. 117
Kern River near Bakersfield, Cal. 119
Erskine Creek near Bodfish, Cal. 120
Tulare Lake basin. 121
Tulare Lake in Kings County, Cal. 121
Deer Creek at Hot Springs, Cal. 122
Tule River near Portersville, Cal. 124
Bear Creek near Springville, Cal. 126
South Fork of Tule River near Portersville, Cal. 127
Kaweah River near Three Rivers, Cal. 129
North Fork of Kaweah River at Kaweah, Cal. 131
South Fork of Kaweah River near Three Rivers, Cal. 132
Kings River near Sanger, Cal. 134
Dinkey Creek near Ockenden, Cal. 136
San Joaquin River basin. 137
San Joaquin River near Shaver, Cal. 137
San Joaquin River near Friant, Cal. 138
San Joaquin River near Newman, Cal. 140
Big Creek near Big Creek, Cal. 141
Pitman Creek at Big Creek, Cal. 143
Crane Valley reservoir near North Fork, Cal. 144
Evaporation from Crane Valley reservoir near North Fork, Cal. 146
South Fork Creek near North Fork, Cal. 146

Digitized by Google

Gaging-station records—Continued.
San Joaquin River basin—Continued. Page.
Whiskey Creek near North Fork, Cal. 147
Merced River above Illilouette Creek, near Yosemite, Cal. 149
Merced River at Happy Isles Bridge, near Yosemite, Cal. 150
Merced River at Yosemite, Cal. 151
Illilouette Creek near Yosemite, Cal. 153
Tenaya Creek near Yosemite, Cal. 154
Yosemite Creek at Yosemite, Cal. 156
South Fork of Merced River near Wawona, Cal. 158
Tuolumne River at Hetch Hetchy cabin, near Sequoia, Cal. 160
Tuolumne River at Hetch Hetchy dam site, near Sequoia, Cal. 162
Tuolumne River below Hetch Hetchy dam site, near Sequoia, Cal. 164
Tuolumne River near Groveland, Cal. 165
Tuolumne River above La Grange dam, near La Grange, Cal. 167
Tuolumne River at La Grange dam, near La Grange, Cal. 169
Cherry Creek near Sequoia, Cal. 172
Eleanor Creek near Sequoia, Cal. 174
Evaporation from Lake Eleanor near Sequoia, Cal. 175
Jawbone Creek near Tuolumne, Cal. 176
South Fork of Tuolumne River near Sequoia, Cal. 177
Golden Rock ditch near Sequoia, Cal. 179
South Fork of Tuolumne River near Groveland, Cal. 180
Yosemite Power Co.'s canal near La Grange, Cal. 181
Modesto canal near La Grange, Cal. 183
Turlock canal near La Grange, Cal. 184
Middle Fork of Stanislaus River at Sand Bar Flat, near Avery, Cal. 186
Stanislaus River at Knights Ferry, Cal. 188
Relief reservoir near Baker Station, Cal. 190
Relief Creek below Relief reservoir, near Baker Station, Cal. 191
North Fork of Stanislaus River near Avery, Cal. 193
Utica Gold Mining Co.'s canal near Avery, Cal. 195
South Fork of Stanislaus River at Strawberry, Cal. 197
South San Joaquin canal near Knights Ferry, Cal. 198
Oakdale canal near Knights Ferry, Cal. 200
Calaveras River at Jenny Lind, Cal. 202
Mokelumne River near Clements, Cal. 204
Middle Fork of Mokelumne River at West Point, Cal. 205
South Fork of Mokelumne River near Railroad Flat, Cal. 207
Licking Fork of Mokelumne River near Railroad Flat, Cal. 209
North Fork of Cosumnes River near El Dorado, Cal. 210
Cosumnes River at Michigan Bar, Cal. 212
Goose Lake basin. 213
Drews Creek reservoir near Lakeview, Oreg. 213
Drews Creek near Lakeview, Oreg. 214
North Drews canal near Lakeview, Oreg. 216
Cottonwood Creek near Lakeview, Oreg. 217
Thomas Creek near Lakeview, Oreg. 219
Sacramento River basin. 220
Sacramento River at Castella, Cal. 220
Sacramento River near Red Bluff, Cal. 222
Pit River at Henderson, Cal. 224
Pit River near Ydalpom, Cal. 226
Hat Creek at Hat Creek, Cal. 227

Digitized by Google

Gaging-station records—Continued.
Sacramento River basin—Continued. Page.
Kosk Creek near Henderson, Cal. 229
McCloud River at Baird, Cal. 231
Deer Creek near Vina, Cal. 232
Stony Creek near Stonyford, Cal. 234
Little Stony Creek near Lodoga, Cal. 235
North Fork of Feather River near Prattville, Cal. 237
North Fork of Feather River at Big Bar, Cal. 238
Feather River at Oroville, Cal. 239
Butt Creek at Butte Valley, Cal. 241
Indian Creek near Crescent Mills, Cal. 242
Spanish Creek at Keddie, Cal. 244
Middle Fork of Feather River near Cromberg, Cal. 246
Middle Fork of Feather River near Oroville, Cal. 247
South Fork of Feather River at Enterprise, Cal. 249
Palermo Land & Water Co.'s canal at Enterprise, Cal. 250
Middle Fork of Yuba River near North San Juan, Cal. 252
Yuba River at Smartsville, Cal. 254
Oregon Creek near North San Juan, Cal. 255
North Fork of Yuba River at Goodyear Bar, Cal. 257
North Fork of North Fork of Yuba River at Downieville, Cal. 259
Rock Creek at Goodyear Bar, Cal. 261
Goodyear Creek at Goodyear Bar, Cal. 262
Bear River near Colfax, Cal. 264
Bear River at Van Trent, Cal. 265
Bear River canal near Colfax, Cal. 267
North Fork of American River near Colfax, Cal. 268
American River at Fairoaks, Cal. 270
Middle Fork of American River near East Auburn, Cal. 272
South Fork of American River near Placerville, Cal. 273
Clear Lake at Lakeport, Cal. 275
Cache Creek at Lower Lake, Cal. 276
Cache Creek at Yolo, Cal. 278
Putah Creek at Winters, Cal. 279
Eel River basin. 281
Eel River at Scotia, Cal. 281
Middle Eel River near Covelo, Cal. 282
Klamath River basin. 284
Williamson River at Chiloquin, Oreg. 284
Upper Klamath Lake near Klamath Falls, Oreg. 286
Link River at Klamath Falls, Oreg. 286
Klamath River at Spencer Bridge, near Keno, Oreg. 289
Klamath River near Seiad Valley, Cal. 292
Klamath River near Requa, Cal. 294
Sprague River near Yainax, Oreg. 295
Sprague River at Chiloquin, Oreg. 297
Sycan River near Yainax, Oreg. 299
Modoc Point canal at Chiloquin, Oreg. 301
Wood River at Fort Klamath, Oreg. 302
Fourmile Creek near Odessa, Oreg. 304
"A" canal at Klamath Falls, Oreg. 306
Lost River above Olene, Oreg. 307
Lost River at Wilson bridge, near Olene, Oreg. 309

Digitized by Google

Gaging-station records—Continued.
Klamath River basin—Continued. Page.
Lost River diversion canal near Olene, Oreg. 311
Tule Lake near Merrill, Oreg. 313
Miller Creek near Lorella, Oreg. 315
Olene wasteway at Olene, Oreg. 316
"G" canal near Olene, Oreg. 317
Lower Klamath Lake near Brownell, Cal. 319
East Fork of Scott River at Callahan, Cal. 319
Scott River at Callahan, Cal. 320
Indian Creek near Happy Camp, Cal. 321
Salmon River at Somesbar, Cal. 322
Trinity River at Lewiston, Cal. 324
Trinity River at Hoopa, Cal. 325
Coffee Creek at Coffee, Cal. 326
Smith River basin. 327
Middle Fork of Smith River near Crescent City, Cal. 327
North Fork of Smith River near Crescent City, Cal. 328
Miscellaneous measurements. 330
Index. 339
Appendix—Gaging stations and publications relating to water resources. 1

ILLUSTRATIONS.

PLATE I. *A*, Price current meter; *B*, Typical gaging station. 14
II. Water-stage recorders: *A*, Stevens; *B*, Gurley printing; *C*, Friez. 15
III. *A*, Notched concrete control on Santa Ysabel Creek near Ramona, Cal.; *B*, Concrete weir on San Luis Rey River near Mesa Grande, Cal. 48
IV. *A*, Water-stage recorder in wooden well and box shelter on Santa Maria Creek near Ramona, Cal.; *B*, Reinforced concrete well and wooden gage house on San Joaquin River at Friant, Cal. 58
V. Santa Maria Creek near Ramona, Cal.; *A*, Upstream view, showing concrete control and staff and recording gages; *B*, Downstream view, showing control, gages, and car and cable. 59
VI. *A*, Cable support on Stanislaus River at Knights Ferry, Cal.; *B*, Timber well and gage house on Tuolumne River at Groveland, Cal. 166
VII. *A*, Cable support on Sacramento River at Red Bluff, Cal.; *B*, Timber well and gage house on Pit River at Henderson, Cal. 222
VIII. *A*, Well and shelter on Middle Fork of Feather River at Cromberg, Cal.; *B*, Reinforced concrete well and gage house on American River at Fairoaks, Cal. 246

Digitized by Google

Digitized by Google

SURFACE WATER SUPPLY OF PACIFIC SLOPE BASINS IN CALIFORNIA, 1915.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 14 reports presenting results of measurements of flow made on streams in the United States during the year ending September 30, 1915.

The data presented in these reports were collected by the United States Geological Survey under authority implied in the organic law (20 Stat. L., p. 394), which contains the following paragraph:

Provided, That this officer [the Director] shall have the direction of the Geological Survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies of water supply for irrigation. Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal years ending June 30, 1895–1915.

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911 to 1916, inclusive	150,000

In the execution of the work many private and State organizations have cooperated, either by furnishing data or by assisting in collecting data. Acknowledgments for coopertion of the first kind are made in connection with the description of each station affected; cooperation of the second kind is acknowledged on page 16.

Measurements of stream flow have been made at about 3,800 points in the United States and also at many points in small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, and the Hawaiian Islands. In July, 1915, 1,350 gaging stations were being maintained by the Survey and the cooperating organizations. Many miscel-

Digitized by Google

laneous discharge measurements were made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country, and will be made available in water-supply papers from time to time. Information in regard to publications relating to water resource is presented in the appendix to this report.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with work of a certain class. These terms may be divided into two groups—(1) those that represent the rate of flow, as second-feet, gallons per minute, miner's inches, and discharge in second-feet per square mile, and (2) those that represent the actual quantity of water, as run-off in depth in inches, acre-feet, and millions of cubic feet. The principal terms used in this series of reports are second-feet, second-feet per square mile, run-off in inches, acre-feet, and millions of cubic feet. They may be defined as follows:

"Second-feet" is an abbreviation for "cubic feet per second." A second-foot is the rate of discharge of water flowing in a channel of rectangular cross section 1 foot wide and 1 foot deep at an average velocity of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the tables of convenient equivalents (p. 11).

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off (depth in inches)" is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth of inches.

An "acre-foot" is equivalent to 43,560 cubic feet and is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage.

"Millions of cubic feet" is used to express quantities of water stored in reservoirs, most frequently in connection with studies of flood control.

The following terms used in these reports are not in common use:

"Stage-discharge relation," an abbreviation for the term "relation of gage height to discharge."

"Control," "control section," and "point of control," terms used to designate the section or sections of the stream below the gage

Digitized by Google

which determine the stage-discharge relation at the gage. It should be noted that the control may not be the same section or sections at all stages.

The "point of zero flow" for a given gaging station is that point on the gage—the gage height—to which the surface of the river would fall if there were no flow.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

Table for converting discharge in second-feet per square mile into run-off in depth in inches over the area.

Discharge in second-feet per square mile.	Run-off in inches.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1.....	0.03719	1.041	1.079	1.116	1.153
2.....	.07438	2.083	2.157	2.231	2.306
3.....	.11157	3.124	3.236	3.347	3.459
4.....	.14876	4.165	4.314	4.463	4.612
5.....	.18595	5.207	5.393	5.578	5.764
6.....	.22314	6.248	6.471	6.694	6.917
7.....	.26033	7.289	7.550	7.810	8.070
8.....	.29752	8.331	8.628	8.926	9.223
9.....	.33471	9.372	9.707	10.041	10.376

NOTE.—For part of a month multiply the run-off for 1 day by the number of days.

Table for converting discharge in second-feet into run-off in acre-feet.

Discharge in second-feet.	Run-off in acre-feet.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1.....	1.983	55.54	57.52	59.50	61.49
2.....	3.967	111.1	115.0	119.0	123.0
3.....	5.950	166.6	172.6	178.5	184.5
4.....	7.934	222.1	230.1	238.0	246.0
5.....	9.917	277.7	287.6	297.5	307.4
6.....	11.90	333.2	345.1	357.0	368.9
7.....	13.88	388.8	402.6	416.5	430.4
8.....	15.87	444.3	460.2	476.0	491.9
9.....	17.85	499.8	517.7	535.5	553.4

NOTE.—For part of a month multiply the run-off for 1 day by the number of days.

Table for converting discharge in second-feet into run-off in millions of cubic feet.

Discharge in second-feet.	Run-off in millions of cubic feet.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1.....	0.0864	2.419	2.506	2.592	2.678
2.....	.1728	4.838	5.012	5.184	5.356
3.....	.2592	7.257	7.518	7.776	8.034
4.....	.3456	9.676	10.02	10.37	10.71
5.....	.4320	12.10	12.53	12.96	13.39
6.....	.5184	14.51	15.04	15.55	16.07
7.....	.6048	16.93	17.54	18.14	18.75
8.....	.6912	19.35	20.05	20.74	21.42
9.....	.7776	21.77	22.55	23.33	24.10

NOTE.—For part of a month multiply the run-off for 1 day by the number of days.

Digitized by Google

Table for converting discharge in second-feet into run-off in millions of gallons.

Discharge in second-feet.	Run-off in millions of gallons.				
	1 day.	28 days.	29 days.	30 days.	31 days.
1	0.6463	18.10	18.74	19.39	20.04
2	1.293	36.20	37.48	38.78	40.08
3	1.939	54.30	56.22	58.17	60.12
4	2.585	72.40	74.96	77.56	80.16
5	3.232	90.50	93.70	96.95	100.2
6	3.878	108.6	112.4	116.3	120.2
7	4.524	126.7	131.2	135.7	140.3
8	5.171	144.8	149.9	155.1	160.3
9	5.817	162.9	168.7	174.5	180.4

NOTE.—For part of a month multiply the run-off for 1 day by the number of days.

Table for converting velocity in feet per second into velocity in miles per hour.

[1 foot per second=0.681818 mile per hour, or two-thirds mile per hour, very nearly; 1 mile per hour=1.4666 feet per second. In computing the table the figures 0.68182 and 1.4667 were used.]

Feet per second (units).	Miles per hour for tenths of foot per second.									
	0	1	2	3	4	5	6	7	8	9
0	0.000	0.068	0.136	0.205	0.273	0.341	0.409	0.477	0.545	0.614
1	.682	.750	.818	.886	.995	1.02	1.09	1.16	1.23	1.30
2	1.36	1.43	1.50	1.57	1.64	1.70	1.77	1.84	1.91	1.98
3	2.05	2.11	2.18	2.25	2.32	2.39	2.45	2.52	2.59	2.66
4	2.73	2.80	2.86	2.93	3.00	3.07	3.14	3.20	3.27	3.34
5	3.41	3.48	3.55	3.61	3.68	3.75	3.82	3.89	3.95	4.02
6	4.09	4.16	4.23	4.30	4.36	4.43	4.50	4.57	4.64	4.70
7	4.77	4.84	4.91	4.98	5.05	5.11	5.18	5.25	5.32	5.39
8	5.45	5.52	5.59	5.66	5.73	5.80	5.86	5.93	6.00	6.07
9	6.14	6.20	6.27	6.34	6.41	6.48	6.55	6.61	6.68	6.75

Table for converting discharge in second-feet into theoretical horsepower per foot of fall.

[1 second-foot=0.1136 theoretical horsepower per foot of fall. Weight of 1 cubic foot of water=62.5 pounds.]

Tens.	Units.									
	0	1	2	3	4	5	6	7	8	9
0	0.00	0.114	0.227	0.341	0.454	0.568	0.682	0.795	0.909	1.02
1	1.14	1.25	1.36	1.48	1.59	1.70	1.82	1.93	2.04	2.16
2	2.27	2.39	2.50	2.61	2.73	2.84	2.95	3.07	3.18	3.29
3	3.41	3.52	3.64	3.75	3.86	3.98	4.09	4.20	4.32	4.43
4	4.54	4.66	4.77	4.88	5.00	5.11	5.23	5.34	5.45	5.57
5	5.68	5.79	5.91	6.02	6.13	6.25	6.36	6.48	6.59	6.70
6	6.82	6.93	7.04	7.16	7.27	7.38	7.50	7.61	7.72	7.84
7	7.95	8.07	8.18	8.29	8.41	8.52	8.63	8.75	8.86	8.97
8	9.09	9.20	9.32	9.43	9.54	9.66	9.77	9.88	10.0	10.1
9	10.2	10.3	10.5	10.6	10.7	10.8	10.9	11.0	11.1	11.2

1 second-foot equals 40 California miner's inches (law of Mar. 23, 1901).

1 second-foot equals 38.4 Colorado miner's inches.

1 second-foot equals 40 Arizona miner's inches.

1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,317 gallons for one day.

1 second-foot for one year (365 days) covers 1 square mile13.574 inches, or 1.131 feet deep.

1 second-foot for one year (365 days) equals 31,536,000 cubic feet.

1 second-foot equals about 1 acre-inch per hour.

Digitized by Google

1 second-foot for one year (365 days) equals 724 acre-feet.
1 second-foot for one day equals 86,400 cubic feet.
1,000,000,000 (1 United States billion) cubic feet equals 11,570 second-feet for one day.
1,000,000,000 cubic feet equals 414 second-feet for one 28-day month.
1,000,000,000 cubic feet equals 399 second-feet for one 29-day month.
1,000,000,000 cubic feet equals 386 second-feet for one 30-day month.
1,000,000,000 cubic feet equals 373 second-feet for one 31-day month.
100 California miner's inches equals 18.7 United States gallons per second.
100 California miner's inches for one day equals 4.96 acre-feet.
100 Colorado miner's inches equals 2.60 second-feet.
100 Colorado miner's inches equals 19.5 United States gallons per second.
100 Colorado miner's inches for one day equals 5.17 acre-feet.
100 United States gallons per minute equals 0.223 second-foot.
100 United States gallons per minute for one day equals 0.442 acre-foot.
1,000,000 United States gallons per day equals 1.55 second-feet.
1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1½ horsepower equals about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Second-feet} \times \text{fall in feet}}{11}$ = net horsepower on water wheel realizing 80 per cent of theoretical power.

EXPLANATION OF DATA.

The data presented in this report cover the year beginning October 1, 1914, and ending September 30, 1915. At the first of January in most parts of the country a large amount of the precipitation for the preceding three months is stored either as ground water, in the form of snow, or in lakes. This stored water passes off in the streams during the spring break-up. At the end of September the only stored water available for run-off in the streams is possibly a small amount held in ground storage. Therefore the run-off for a year beginning with October 1 is practically all derived from precipitation occurring within that year.

Digitized by Google

The base data collected at gaging stations (Pl. I, *B*) consist of records of stage, measurements of discharge, and general information used to supplement the gage heights and discharge measurements in determining the daily flow. The records of stage are obtained either from direct readings on a staff gage or from a water-stage recorder (Pl. II) that gives a continuous record of the fluctuations. Measurements of discharge are made with a current meter or by the general methods outlined in standard textbooks on the measurement of river discharge.

From the discharge measurements rating tables are prepared that give the discharge for any stage, and these rating tables, when applied to the gage heights give the daily discharge from which the monthly and yearly mean discharge is determined.

The data presented for each regular gaging station comprise a description of the station, a table giving results of discharge measurements, a table showing the daily discharge of the stream, and a table of monthly and yearly discharge and run-off.

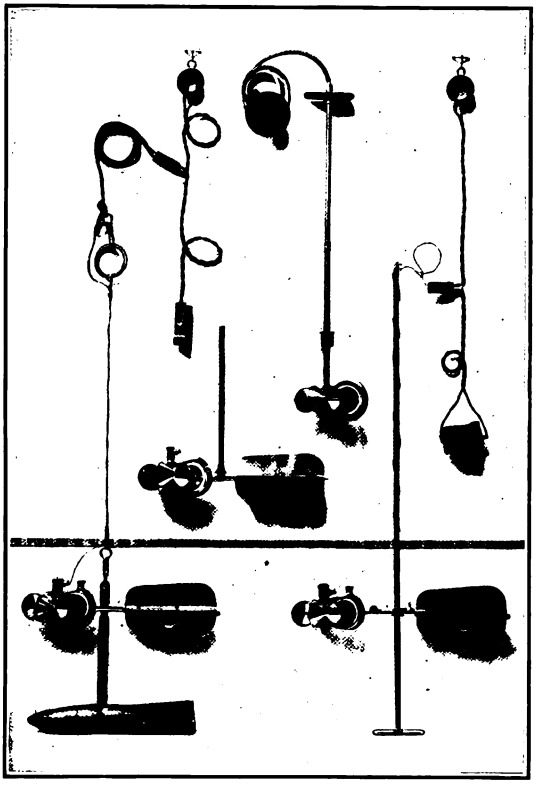
If the base data are insufficient to determine the daily discharge, tables giving daily gage heights and results of discharge measurements are published.

The description of the station gives, in addition to statements regarding the location and equipment, information in regard to any conditions that may affect the constancy of the stage-discharge relation, covering such subjects as the occurrence of ice, the use of the stream for log driving, shifting of channel, and the cause and effect of backwater; it gives also information as to diversions that decrease the flow at the gage, artificial regulation, maximum and minimum recorded stages, and the accuracy of the results.

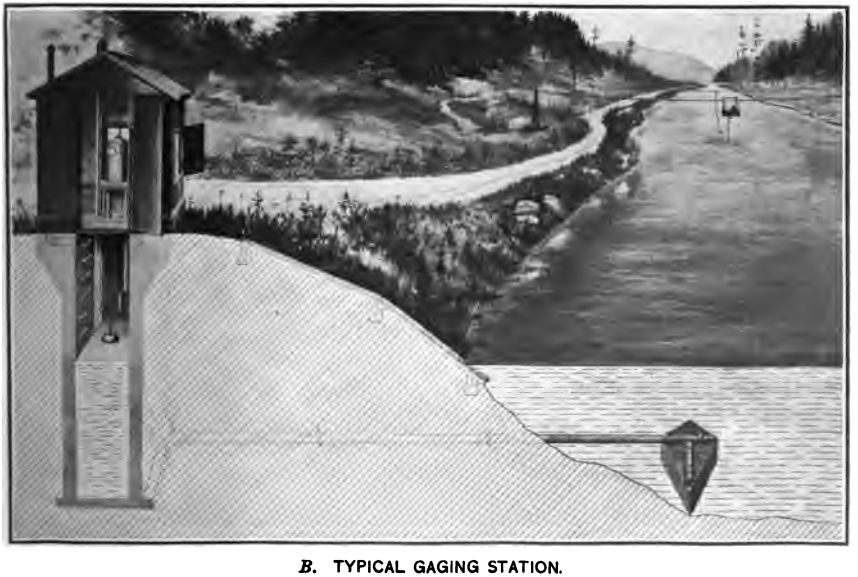
The table of daily discharge gives the discharge in second-feet corresponding to the mean of the gage heights read each day. At stations subject to sudden or rapid diurnal fluctuation the discharge obtained from the rating table and the mean daily gage height may not be the true mean discharge for the day. If such stations are equipped with water-stage recorders, the mean daily discharge may be obtained by computing the mean daily gage height and applying it to the rating table, by averaging discharge at regular intervals during the day, or by use of the discharge integrator—an instrument operating on the principle of the planimeter and containing as an essential element the rating curve of the station.

In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column of "Mini-

Digitized by Google

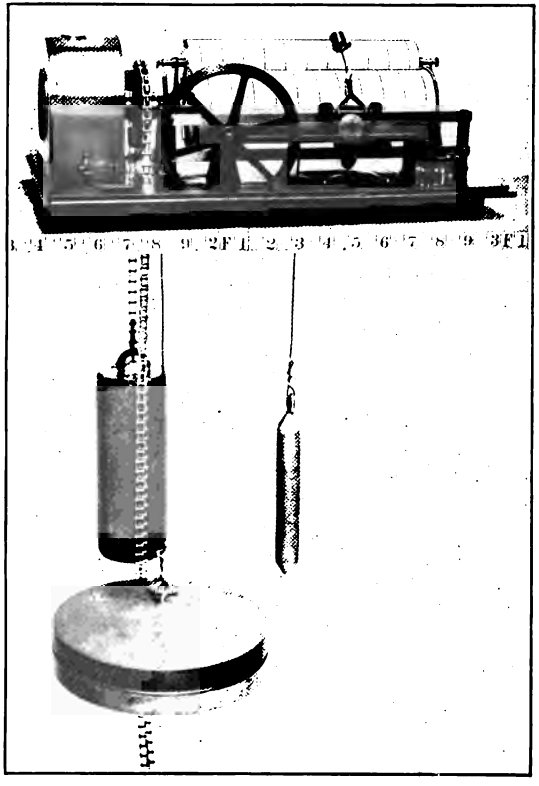


A. PRICE CURRENT METERS.

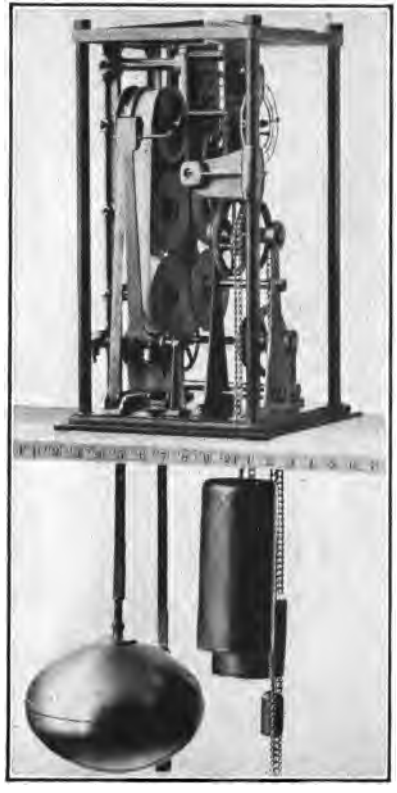


B. TYPICAL GAGING STATION.

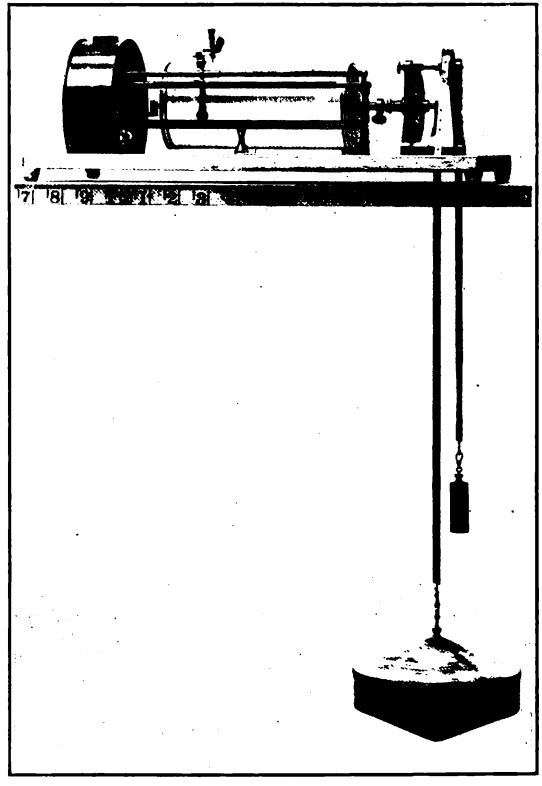
Digitized by Google



A. STEVENS.



B. GURLEY PRINTING.



C. FRIEZ.

WATER-STAGE RECORDERS.

Digitized by Google

mum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this average flow the computations recorded in the remaining columns, which are defined on pages 10 and 11, are based.

ACCURACY OF FIELD DATA AND COMPUTED RESULTS.

The accuracy of stream-flow data depends primarily (1) on the permanence of the stage-discharge relation and (2) on the accuracy of observation of stage, measurements of flow, and interpretation of records.

Footnotes added to the daily-discharge tables give information regarding the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly discharge table. For the rating tables, "well-defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate" within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The letter in the column headed "Accuracy," in the monthly discharge table rates the accuracy of the monthly mean and not that of the estimate of maximum or minimum discharge or the discharge for any one day. The rating is determined by considering the accuracy of the rating curve, the probable reliability of the observer, the number of gage readings per day, the range of the fluctuation in stage, and local conditions. In this column A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

The monthly means for any station may represent with high accuracy the quantity of water flowing past the gage, but the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors caused by the inclusion of large noncontributing districts in the measured drainage area, by lack of information concerning water diverted for irrigation or other use, or by inability to interpret the effect of artificial regulation of the flow of the river above the station. "Second-feet per square mile" and "run-off (depth in inches)" are therefore not computed if such errors appear probable. The computations are also omitted for streams draining areas in which the annual rainfall is less than 20 inches. All figures representing "second-feet per square mile" and "run-off (depth in inches)" previously published by the Survey should be used with caution because of possible inherent sources of error not known to the Survey.

Digitized by Google

The table of monthly discharge gives only a general idea of the flow at the station and should not be used for other than preliminary estimates; the tables of daily discharge allow more detailed studies of the variation in flow. It should be borne in mind, however, that the observations in each succeeding year may be expected to throw new light on data already collected and published.

COOPERATION.

Acts of the State legislature, approved March 16, 1903, March 20, 1905, March 11, 1907, and April 22, 1909, empower the State authorities of California to enter into contracts with the Director of the United States Geological Survey for the purpose of making topographic maps, gaging streams, surveying reservoir sites and canal locations for the conservation and utilization of the flood and storm waters of the State. The work for the year ending September 30, 1915, was maintained in accordance with the contract approved by the State board of control and signed by W. F. McClure, State engineer. Additional funds were furnished by the State Conservation Commission, of which George C. Pardee is chairman and Francis Cuttle and J. P. Baumgartner are members.

Assistance in the maintenance of gaging stations was furnished by the United States Forest Service, United States Weather Bureau, United States Indian Office, United States Bureau of Fisheries, Yosemite National Park, Sequoia National Park, City of San Francisco, Santa Barbara Water Commission, Volcan Land & Water Co., Cuyamaca Water Co., Sweetwater Water Co., La Mesa Mutual Water Co., Southern California Edison Co., the Turlock, Modesto, Oakdale, and South San Joaquin irrigation districts, Yosemite Power Co., Utica Gold Mining Co., Sierra & San Francisco Power Co., Pacific Gas & Electric Co., Oro Electric Co., Yolo Water & Power Co., C. H. Lee, J. T. Mason, H. O. Wickes, and W. H. Hotelling.

Many private records of stream flow have been furnished for publication. Acknowledgment for this cooperation is made in the descriptive matter preceding the data.

The work in Oregon was carried on under a cooperative agreement with the State through John H. Lewis, State engineer. Financial cooperation was also furnished by the United States Indian Office, Goose Lake Valley Irrigation Co., and Rogue River Valley Canal Co.

DIVISION OF WORK.

The data for stations in California were collected and prepared for publication under the direction of H. D. McGlashan, district engineer, by F. C. Ebert, Lasley Lee, Charles Leidl, R. C. Rice, W. V. Hardy, C. J. Emerson, C. P. Firestone, H. J. Tompkins, J. H. Morgan, J. F. Kunesh, and M. B. Trelease.

Digitized by Google

Data for stations in Oregon were collected and prepared for publication under the direction of F. F. Henshaw, district engineer, by C. L. Batchelder, P. V. Hodges, R. C. Briggs, J. J. Hubbell, and Norris Bostwick.

The manuscript was assembled by B. J. Peterson.

GAGING-STATION RECORDS.

TIA JUANA RIVER BASIN.

TIA JUANA RIVER NEAR NESTOR, CAL.

LOCATION.—At highway bridge on line between secs. 3 and 4, T. 19 S., R. 2 W., 1¾ miles south of Nestor, San Diego County, and 3 miles above mouth of river.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 29 to September 30, 1915, when station was discontinued.

GAGE.—Stage determined twice a day by measuring from top of bedplate of east truss of bridge to the water surface; readings reduced to elevations above sea level, United States Geological Survey datum. Observer, John McCan.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Sand; shifting.

DIVERSIONS.—Dulzura conduit diverts from Cottonwood Creek about 12½ miles above its junction with Tia Juana River; no other large diversions above station. Water for irrigation is pumped from wells in valley above station.

REGULATION.—Morena reservoir, capacity 46,000 acre-feet, is on Cottonwood Creek about 19 miles above its mouth.

ACCURACY.—Results reported as good.

COOPERATION.—Complete record furnished by C. H. Lee, consulting engineer.

Discharge measurements of Tia Juana River near Nestor, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 29[a]	K. B. Sleppy	23.30	524	Mar. 3[a]	D. L. Lee	23.70	1,400
Feb. 5[a]	D. L. Lee	22.80	548	27	K. B. Sleppy	22.41	62.0
9[a]	K. B. Sleppy	22.17	84.0	Apr. 6	do	22.34	47.0
11[b]	D. L. Lee	25.60	2,700	10	D. L. Lee	22.28	31.7
14[a]	do	23.05	880	May 1	do	23.02	170
23[a]	do	23.06	506	June 7	do	21.86	1.0

[a] Made from bridge; angle of current, 30°; correction coefficient applied, 0.866 and flow in north channel added.

[b] Float measurement.

Digitized by Google

Daily discharge, in second-feet, of Tia Juana River near Nestor, Cal., for the year ending Sept. 30, 1915.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	.....	202	893	48	201	18	16	.....	918	381	29	185	.....
2	.....	620	2,361	48	638	18	17	.....	655	332	31	114	.....
3	.....	1,800	1,909	40	852	14	18	.....	627	283	18	102	.....
4	.....	1,245	1,539	40	934	14	19	.....	488	217	13	201	.....
5	.....	770	1,506	39	1,157	10	20	.....	455	160	11	160	.....
6	.....	306	1,324	39	1,414	2	21	.....	1,147	154	9	108	.....
7	.....	233	1,175	39	1,216	2	22	.....	975	119	10	72	.....
8	.....	131	1,026	32	975	.....	23	.....	728	92	21	61	.....
9	.....	95	952	26	957	.....	24	.....	567	92	23	45	.....
10	.....	168	1,026	30	834	.....	25	.....	713	72	28	61	.....
11	.....	3,061	1,059	25	424	.....	26	.....	877	58	25	39	.....
12	.....	1,921	909	25	363	.....	27	.....	770	58	15	31	.....
13	.....	1,608	860	24	242	.....	28	.....	729	58	10	25	.....
14	.....	1,313	721	23	340	.....	29	530	.....	58	12	23	.....
15	.....	1,032	613	22	267	.....	30	2,743	.....	58	27	23	.....
							31	806	.....	50	.....	18	.....

NOTE.—No flow Oct. 1 to Jan. 28 and June 8 to Sept. 30.

Monthly discharge of Tia Juana River near Nestor, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	0	0	0	0
November	0	0	0	0
December	0	0	0	0
January	2,743	0	132	8,076
February	3,061	95	863	47,825
March	2,361	50	649	39,828
April	48	10	26	1,548
May	1,414	18	390	23,922
June	18	0	2.6	154
July	0	0	0	0
August	0	0	0	0
September	0	0	0	0
The year	3,061	0	168	121,353

COTTONWOOD CREEK NEAR DULZURA, CAL.

LOCATION.—In the SW. ¼ sec. 15, T. 17 S., R. 3 E., at Barrett dam, 1½ miles below intake of Dulzura conduit, and about 17 miles northeast of Dulzura, San Diego County. Lyons Creek enters half a mile and Pine Valley Creek a mile above the station.

DRAINAGE AREA.—246 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 1, 1906, to September 30, 1915.

GAGE.—Two vertical staff gages have been in use since 1909; readings on upper staff, which is fastened to upstream face of dam on left bank, show depth of water over crest; lower staff is fastened to upstream face of dam between flume and right bank and is read when no water flows over crest of dam; datum of lower gage is 2.50 feet below that of upper gage. Previous to 1909 several gages at independent datums were used.

DISCHARGE MEASUREMENTS.—Made by wading at low concrete dam, back of which sand and gravel have been deposited to the level of its crest. At low stages the flow is restricted to a rectangular wooden flume through the wall of the dam, but at high stages the flow is over the entire length of the crest, which is 61 feet. At high stages only float measurements have been made.

Digitized by Google

CHANNEL AND CONTROL.—Above and below dam channel is principally sand and is shifting. Dam acts as an artificial control for the station.

EXTREMES OF DISCHARGE.—1906–1915: Maximum mean daily discharge, 5,800 second-feet March 24, 1906; minimum, no flow for several months every year since completion of Dulzura conduit in January, 1909.

DIVERSIONS.—Dulzura conduit diverts water from Cottonwood and Pine Valley creeks, about half a mile above their junction, into Dulzura Creek drainage basin. See record Dulzura conduit near Dulzura, Cal. (pp. 21–22).

REGULATION.—Morena reservoir on Cottonwood Creek, about 8 miles above Barrett dam, has a capacity of 46,000 acre-feet. Water stored in this reservoir is released when needed for Dulzura conduit. September 30, 1915, reservoir gage read 118.6 feet, showing 15,900 acre-feet of storage.

COOPERATION.—Record showing gallons per day furnished by the city of San Diego through George Cromwell, city engineer. Daily discharge converted into second-feet and monthly discharge computed by United States Geological Survey.

Discharge measurements of Cottonwood Creek near Dulzura, Cal., during the year ending Sept. 30, 1915.

[Made by F. C. Ebert.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Apr. 5	0.30	4.0
Sept. 23	.30	1.0

Daily discharge, in second-feet, of Cottonwood Creek near Dulzura, Cal., for the year ending Sept. 30, 1915.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	0.70	12.2	82	5.3	76	4.9	2.6	2.5	3.7
2	0.35	.70	74	115	5.0	95	6.6	2.5	2.4	3.7
3	.35	.70	100	82	4.6	96	4.7	2.5	2.2	3.7
4	.35	.70	29	78	4.3	104	4.1	2.5	2.3	3.7
5	.35	.70	9.4	75	4.4	257	3.8	2.5	2.2	3.7
6	.35	.70	3.7	65	5.4	176	3.6	2.3	2.0	3.7
7	.35	.70	2.0	62	5.0	130	3.5	2.2	2.0	3.7
8	.35	.70	1.2	46	4.9	118	3.4	2.2	1.9	3.7
9	.35	.70	.43	33	4.6	102	3.3	2.2	1.9	3.7
10	.35	.70	81	31	4.4	95	3.3	2.3	1.8	3.7
11	.35	.70	448	30	4.3	80	3.3	2.3	1.7	3.7
12	1.2	.70	190	19.6	4.3	67	3.3	2.2	1.6	3.7
13	.70	.70	112	13.8	7.0	64	3.2	2.2	1.9	3.7
14	.56	.70	83	10.9	9.8	42	3.2	2.1	3.7	3.7
15	.56	.70	65	8.9	5.7	35	3.0	2.1	3.7	3.7
16	.56	.70	42	7.8	6.2	28	2.9	2.2	3.7	3.7
17	1.30	.70	43	6.7	5.3	25	2.9	2.1	3.7	3.7
18	1.70	.70	20	5.1	5.4	45	3.0	2.1	3.7	3.7
19	1.30	.70	18.2	5.3	4.7	33	2.8	2.1	3.7	3.6
20	1.30	.70	43	4.6	4.6	22	2.9	1.9	3.7	3.4
21	.70	.70	60	4.8	5.1	14.7	2.8	1.9	3.7	3.3
22	.70	1.3	68	4.1	11.2	10.5	2.8	2.0	3.7	2.8
23	.70	.70	44	3.1	8.6	27	2.8	2.0	3.7	2.7
24	.70	.70	22	2.9	9.9	22	2.8	2.0	3.7	3.0
25	.70	.70	32	2.9	4.9	7.1	2.8	2.5	3.7	3.6
26	.70	.70	23	2.9	5.4	5.9	2.8	2.5	3.7	4.4
27	.70	.70	14.3	3.3	5.1	5.1	2.8	2.5	3.7	4.4
28	.70	1.0	10.2	3.2	5.4	4.8	2.6	2.4	3.7	4.2
29	.70	169	.....	3.4	7.5	4.7	2.5	2.5	3.7	4.0
30	.70	141	.....	4.4	65	4.5	2.6	2.7	3.7	3.9
31	.70	39	.....	5.4	.....	4.3	.....	2.7	3.7	.....

NOTE.—No flow Oct. 1 to Dec. 1.

Digitized by Google

Monthly discharge of Cottonwood Creek near Dulzura, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	0.0	0.0	0.0	0
November	.0	.0	.0	0
December	1.7	.0	.657	40
January	169	.70	11.9	732
February	448	.43	59.0	3,280
March	115	2.9	26.5	1,630
April	65	4.3	7.78	463
May	257	4.3	58.1	3,570
June	6.6	2.5	3.30	196
July	2.7	1.9	2.28	140
August	3.7	1.6	3.00	184
September	4.4	2.7	3.66	218
The year	448	.0	14.4	10,500

NOTE.—Monthly and yearly discharge computed by engineers of the U. S. Geological Survey.

Combined daily discharge, in second-feet, of Cottonwood Creek and Dulzura conduit near Dulzura, Cal., for the year ending Sept. 30, 1915.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.00	1.7	57	131	33	128	42	15.5	6.1	3.7
2	.35	1.2	120	160	32	147	43	14.7	6.0	3.7
3	.35	1.6	144	130	32	148	41	14.4	4.5	3.7
4	.35	.7	72	127	30	155	41	14.4	4.0	3.7
5	.35	1.9	52	121	29	310	39	13.8	3.6	3.7
6	.35	2.3	46	111	33	227	38	13.3	3.2	3.7
7	.35	2.8	34	113	32	180	34	12.9	2.0	3.7
8	.35	3.4	31	95	30	166	32	12.9	1.9	3.7
9	.35	3.0	26	84	29	147	30	11.4	1.9	3.7
10	.35	3.5	127	82	26	131	28	11.5	1.8	3.7
11	.35	3.1	462	79	25	120	28	11.5	1.7	3.7
12	1.2	3.1	194	71	24	111	27	10.7	1.6	3.7
13	.7	3.1	136	65	21	98	26	10.0	1.9	3.7
14	.56	3.1	127	62	27	85	26	10.3	3.7	3.7
15	.56	3.4	108	58	38	86	25	9.2	3.7	3.7
16	.56	3.4	84	55	34	75	23	9.4	3.7	3.7
17	1.3	3.1	83	53	27	75	22	9.4	3.7	3.7
18	1.7	2.8	66	50	25	96	21	8.8	3.7	3.7
19	6.6	2.8	61	49	25	82	21	8.6	3.7	3.6
20	6.6	2.0	88	47	23	71	20	7.8	3.7	3.4
21	4.9	2.8	104	45	25	65	19.9	7.4	3.7	3.3
22	3.5	12.6	92	43	52	60	19.9	7.5	3.7	2.8
23	2.8	7.2	71	43	54	61	19.9	7.0	3.7	2.7
24	2.5	7.1	66	40	51	44	19.6	6.5	3.7	3.0
25	1.9	6.6	79	39	48	55	18.6	6.7	3.7	3.6
26	1.2	6.3	70	38	40	54	18.2	6.4	3.7	4.4
27	1.6	5.7	62	43	37	50	17.6	6.1	3.7	4.4
28	2.1	7.9	55	41	34	47	16.7	5.8	3.7	4.2
29	2.0	191	.....	43	46	47	16.0	5.9	3.7	4.0
30	1.9	193	.....	38	116	44	15.8	6.1	3.7	3.9
31	1.9	87	.....	35	.....	42	.....	6.2	3.7	.....

Digitized by Google

Combined monthly discharge of Cottonwood Creek and Dulzura conduit near Dulzura, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	0.0	0.0	0.0	0
November	.0	.0	.0	0
December	6.6	.0	1.60	98
January	193	.7	18.7	1,150
February	462	26	97.0	5,390
March	160	35	70.7	4,350
April	116	21	35.9	2,140
May	310	42	103	6,330
June	43	15.8	26.3	1,560
July	15.5	5.8	9.75	600
August	6.1	1.6	3.45	212
September	4.4	2.7	3.66	218
The year	462	.0	30.5	22,000

DULZURA CONDUIT NEAR DULZURA, CAL.

LOCATION.—Two miles southeast of Dulzura, San Diego County, and 12 miles below intake from Cottonwood Creek. During 1909 and 1910 station was 1½ miles below intake.

RECORDS AVAILABLE.—January 1, 1909, to September 30, 1915.

GAGE.—Lietz water-stage recorder at weir.

DISCHARGE.—Computed from gage-height record at an 8-foot steel plate weir about 1½ miles above lower end of conduit.

EXTREMES OF DISCHARGE.—Maximum discharge reported, 65.1 second-feet February 4, 1911. No flow in conduit for certain periods each year.

ACCURACY.—Water-stage recorder is checked twice every day by patrolman. Loss by seepage between intake and measuring weir estimated at 3 per cent.

COOPERATION.—Record in gallons per day furnished by the city of San Diego through George Cromwell, city engineer. Daily discharge converted into second-feet and monthly discharge computed by United States Geological Survey.

Dulzura conduit diverts water from Cottonwood and Pine Valley creeks about half a mile above their junction. The conduit is 13.38 miles long and is lined with concrete except 4,490 feet of flume and 9,219 feet of tunnel. The average width is about 5 feet and the depth 4 feet 2 inches. The grade is 4 feet in 5,000 and the capacity 40,000,000 gallons per day (62 second-feet). The water, which is stored at Morena reservoir, flows down the natural channel of Cottonwood Creek about 6½ miles to the intake of the conduit. The flow of Pine Valley and Lyons Valley creeks is also diverted into the conduit. From the conduit the water flows down the natural channel of Dulzura Creek into Lower Otay reservoir, where it is diverted for municipal use at San Diego.

Digitized by Google

Daily discharge, in second-feet, of Dulzura conduit near Dulzura, Cal., for the year ending Sept. 30, 1915.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	.....	1.0	45	49	28	52	37	12.9	3.6
2	.....	.46	46	45	27	52	36	12.2	3.6
3	.....	.93	44	48	27	52	36	11.9	2.3
4	.....	.00	43	49	26	51	37	11.9	1.7
5	.....	1.2	43	46	25	53	35	11.3	1.4
6	.....	1.6	42	46	28	51	34	11.0	1.2
7	.....	2.1	32	51	27	50	31	10.7	.....
8	.....	2.7	30	49	25	48	29	10.7	.....
9	.....	2.3	26	51	24	45	27	9.2	.....
10	.....	2.8	46	51	22	36	25	9.2	.....
11	.....	2.4	13.8	49	21	40	25	9.2	.....
12	.....	2.4	4.2	51	20	44	24	8.5	.....
13	.....	2.4	24	51	14.4	34	23	7.8	.....
14	.....	2.4	44	51	17.1	43	23	8.2	.....
15	.....	2.7	43	49	32	51	22	7.1	.....
16	.....	2.7	42	47	28	47	20	7.2	.....
17	.....	2.4	40	46	22	50	19.2	7.3	.....
18	.....	2.1	46	45	20	51	18.4	6.7	.....
19	5.3	2.1	43	44	20	49	17.8	6.5	.....
20	5.3	1.3	45	42	18.8	49	17.1	5.9	.....
21	4.2	2.1	44	40	20	50	17.1	5.5	.....
22	2.8	11.3	24	39	41	49	17.1	5.5	.....
23	2.1	6.5	27	40	45	34	17.1	5.0	.....
24	1.8	6.4	44	37	41	22	16.8	4.5	.....
25	1.2	5.9	47	36	43	48	15.8	4.2	.....
26	.46	5.6	47	35	35	48	15.4	3.9	.....
27	.93	5.0	48	40	32	45	14.8	3.6	.....
28	1.4	6.9	45	38	29	42	14.1	3.4	.....
29	1.3	22	.....	40	39	42	13.5	3.4	.....
30	1.2	52	.....	34	51	40	13.2	3.4	.....
31	1.2	48	.....	30	.....	38	.....	3.5	.....

NOTE.—No flow Oct. 1 to Dec. 18 and Aug. 7 to Sept. 30.

Monthly discharge of Dulzura conduit near Dulzura, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	0.0	0.0	0.0	0
November	.0	.0	.0	0
December	5.3	.0	.942	58
January	52	.0	6.76	416
February	48	4.2	38.1	2,120
March	51	30	44.2	2,720
April	51	14.4	28.3	1,680
May	53	22	45.4	2,790
June	37	13.2	23.0	1,370
July	12.9	3.4	7.46	459
August	3.6	.0	.45	28
September	.0	.0	.0	0
The year	53	.0	16.1	11,600

NOTE.—Monthly and yearly discharge computed by engineers of the United States Geological Survey.

Digitized by Google

SWEETWATER RIVER BASIN.

SWEETWATER RIVER NEAR DESCANSO, CAL.

LOCATION.—In the SE. ¼ sec. 25, T. 15 S., R. 3 E., San Diego County, at Ellis ranch, 1½ miles below Descanso and 2 miles below mouth of Guatay Creek.

DRAINAGE AREA.—43.7 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 21, 1905, to September 30, 1915.

GAGE.—Staff gage in three sections, on left bank at concrete control, a short distance below intake of Ellis ditch; read twice a day by C. H. Ellis. Previous gage was at same datum and practically same location.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Channel composed of sand and fine gravel; shifting. Banks high in most places and not likely to be overflowed. On October 11, 1914, a concrete control was constructed across the channel opposite the original gage. Point of zero flow, gage height 0.5 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.5 feet during night of February 10 (discharge, about 1,750 second-feet, determined from extension of rating curve); minimum stage, October 1 to 5 (estimated discharge, 0.1 second-foot).

1905–1915: Maximum stage recorded, 9.25 feet at 5 p. m. March 24, 1906 (discharge, about 3,000 second-feet, determined from extension of rating curve). No flow during parts of 1910, 1911, and 1913.

DIVERSIONS.—About 0.3 second-foot is diverted above gage for irrigation on Ellis ranch.

REGULATION.—None.

ACCURACY.—Results good except for low-water period, June to September. During this period sand collected in front of the control and caused slight changes in the stage-discharge relation. Rating curve used October 11 to May 24 well defined below 100 second-feet.

Discharge measurements of Sweetwater River near Descanso, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 19	F. C. Ebert	0.80	1.7	Mar. 29	F. C. Ebert	1.47	27
19	.....do	.82	1.8	Apr. 4	.....do	1.36	19
Jan. 27	.....do	.88	2.3	May 18	.....do	1.92	87
Feb. 1	.....do	1.53	30	July 8	.....do	1.15	5.5
4	.....do	1.67	51	8	.....do	1.15	5.4
5	.....do	1.61	41	Aug. 13	R. W. Day	1.09	1.2
Mar. 5	.....do	1.93	86	Sept. 18	F. C. Ebert	.94	.8
5	.....do	1.91	82				

Digitized by Google

Daily discharge, in second-feet, of Sweetwater River near Descanso, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.1	0.8	1.0	1.0	50	95	22	109	37	6.5	2.5	0.9
2	.1	.8	1.0	.9	326	108	21	194	36	6.5	2.5	.9
3	.1	.8	1.0	.9	121	90	21	278	35	6.5	2.5	.9
4	.1	.8	1.0	1.2	46	95	19	480	34	6	2.5	.9
5	.1	.8	.9	1.1	34	95	19	990	32	6	2	.9
6	.2	.8	.9	1.1	30	84	19	524	31	6	2	.9
7	.2	.8	.9	1.0	28	75	19	310	30	6	2	.9
8	.3	.8	1.0	1.0	24	70	18	293	29	5.5	2	.9
9	.3	1.2	1.0	1.0	22	65	18	234	27	5.5	1.5	.9
10	.4	1.0	1.0	1.0	360	62	18	170	26	5.5	1.5	.9
11	.4	1.0	1.0	1.0	769	60	18	141	25	5.5	1.5	.8
12	.5	.9	1.6	1.0	170	58	18	137	24	5	1.5	.8
13	.5	.9	1.2	1.0	108	55	19	121	22	5	1.5	.8
14	.5	.9	1.2	1.0	81	47	21	109	21	5	1.5	.8
15	.5	.9	1.2	1.0	73	42	24	95	20	5	1	.8
16	.5	.9	1.3	1.0	76	39	21	78	19	4.5	1	.8
17	.5	.9	2.0	1.0	93	35	22	65	17	4.5	1	.8
18	.5	.9	1.7	1.0	68	31	24	106	16	4.5	1	.8
19	.6	.9	1.4	1.0	62	29	21	75	15	4.5	1	.8
20	.6	.9	1.5	1.0	108	28	21	71	14	4	1	.7
21	.8	.9	1.4	1.0	95	27	30	62	12	4	1	.7
22	.8	.9	1.3	9.0	86	27	83	57	11	4	1	.6
23	.8	.9	1.2	4.0	65	27	40	50	10	4	1	.6
24	.8	.9	1.2	3.2	55	27	37	47	9	3.5	1	.6
25	.8	.9	1.2	3.7	78	27	35	46	8	3.5	1	1.1
26	.8	.9	1.2	3.2	61	27	29	45	7	3.5	.9	1.2
27	.8	.9	1.2	2.5	52	25	28	44	7	3.5	.9	1.4
28	.8	.9	1.1	7.9	51	24	50	42	7	3	.9	1.4
29	.8	.9	1.0	220	.....	25	88	41	7	3	.9	1.4
30	.8	.9	1.0	234	.....	25	127	40	6.5	3	.9	1.4
31	.8	.....	1.0	62	.....	24	.....	39	.....	3	.9	.....

NOTE.—See "Accuracy" in station description. No gage-height record Oct. 1–10, 16, and Dec. 24–26; discharge estimated.

Monthly discharge of Sweetwater River near Descanso, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	0.8	0.1	0.51	31	D.
November	1.2	.8	.89	53	D.
December	2.0	.9	1.18	73	C.
January	234	.9	18.4	1,130	B.
February	769	22	114	6,330	C.
March	108	24	49.9	3,070	B.
April	127	18	31.7	1,890	B.
May	990	39	164	10,100	C.
June	37	6.5	19.8	1,180	D.
July	6.5	3	4.69	288	D.
August	2.5	.9	1.40	86	D.
September	1.4	.6	.91	54	D.
The year	990	.1	33.5	24,300	

SWEETWATER RIVER NEAR DEHESA, CAL.

LOCATION.—In the NW. ¼ NW. ¼ sec. 20, T. 16 S., R. 2 E., San Diego County, 1,000 feet below mouth of Lawson Creek, and about 3 miles southeast of Dehesa.

DRAINAGE AREA.—112 square miles (measured on topographic maps).

RECORDS AVAILABLE.—December 4, 1913, to September 30, 1915.

Digitized by Google

GAGE.—Bristol water-stage recorder on left bank 100 feet above control, and vertical staff in two sections bolted to solid rock at same site. February 5, 1915, water-stage recorder was moved downstream to a point on left bank 5 feet above control. Original datum was maintained, but there is some slope to the water surface between the two sites. Water-stage recorder not in operation after April 10. After this date readings of the staff gage were taken when current-meter measurements were made.

DISCHARGE MEASUREMENTS.—Made from cable 200 feet below concrete control or by wading.

CHANNEL AND CONTROL.—Bed composed of shifting sand overlying solid rock. A concrete control extending to bedrock has been constructed. Both banks are high and not subject to overflow. Point of zero flow, zero on gage.

EXTREMES OF DISCHARGE.—Maximum stage during year and period 1913–1915 from water-stage recorder, 5.8 feet February 11, 1915 (discharge, about 1,750 second-feet, determined from extension of rating curve); maximum stage doubtless occurred May 5, 1915, but water-stage recorder was not in operation (mean daily discharge, estimated, 1,290 second-feet). Practically no flow August 12 to September 30, 1915.

DIVERSIONS.—About 0.3 second-foot is diverted for irrigation at Ellis ranch near Descanso.

REGULATION.—None.

ACCURACY.—Results good for periods when water-stage recorder was operating satisfactorily. Water-stage recorder not in operation January 28 to 31, and the record April 15 to June 15 was not satisfactory; discharge estimated as about 130 per cent of flow of Sweetwater River near Descanso; discharge after June 15 interpolated between measurements. Moving of gage February 5 made it necessary to rerate the station.

Discharge measurements of Sweetwater River near Dehesa, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 19	F. C. Ebert	0.08	[a] 0.05	Mar. 7	Owen	2.00	138
Jan. 31	J. F. Covert	2.00	132	15	C. L. Fulton	1.60	75
Feb. 5	do	1.70	69	Apr. 1	F. C. Ebert	1.01	35
12	Owen	3.00	397	1	R. W. Day	1.01	34
12	do	2.75	316	5	J. F. Covert	.97	32
14	do	2.1	171	14	C. L. Fulton	1.25	38
17	do	1.93	130	June 22	do	1.00	15
28	C. L. Fulton	1.65	86	July 9	Covert and Fulton	[b] 1.65	5

[a] Estimated.

[b] Mean of two measurements.

Digitized by Google

Daily discharge, in second-feet, of Sweetwater River near Dehesa, Cal., for the year ending Sept. 30, 1915.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	0.1	0.6	1.0	68	198	39	140	49	9	0.5
2	.1	.4	1.0	202	240	34	250	47	9	.5
3	.1	.4	1.0	392	183	36	360	45	8	.4
4	.1	.4	1.0	140	172	36	625	42	8	.4
5	.1	.4	1.0	85	179	32	1,290	40	7	.4
6	.2	.4	1.3	79	156	28	680	38	7	.3
7	.2	.4	1.3	63	133	27	405	36	6	.3
8	.2	.4	1.4	55	114	27	380	33	5	.2
9	.2	.4	1.8	55	117	29	305	31	5	.2
10	.2	.4	1.5	219	122	25	220	29	5	.1
11	.3	.6	1.4	909	131	30	185	27	4	.1
12	.3	.9	1.4	369	119	34	180	24	3	.....
13	.4	.6	1.3	233	101	36	160	22	3	.....
14	.4	.4	1.3	154	87	38	140	20	3	.....
15	.4	.4	1.5	124	84	31	125	18	3	.....
16	.3	.4	1.5	124	81	27	100	15	3	.....
17	.3	.6	1.4	124	78	29	85	15	3	.....
18	.3	1.1	1.3	104	75	31	140	15	3	.....
19	.3	1.5	1.3	96	72	27	100	15	2.5	.....
20	.4	1.4	1.4	148	70	27	92	15	2.5	.....
21	.4	1.1	1.7	187	68	39	81	15	2	.....
22	.4	.9	6.5	124	66	110	74	15	2	.....
23	.4	.9	7.1	119	50	52	65	15	1.5	.....
24	.3	.9	4.7	103	50	48	61	14	1.5	.....
25	.3	1.1	4.7	129	42	46	60	13	1	.....
26	.3	1.3	5.2	116	41	38	58	13	1	.....
27	.3	1.4	5.0	96	40	36	57	12	.9	.....
28	.3	1.3	10	87	39	65	55	11	.8	.....
29	.3	1.2	284	.....	42	115	53	11	.7	.....
30	.3	1.0	302	.....	39	165	52	10	.6	.....
31	.....	1.0	80	.....	37	.....	51	.....	.5	.....

NOTE.—Discharge determined from two rating curves as follows: Oct. 1 to Feb. 5, well defined between 4 and 300 second-feet; Feb. 6 to Apr. 12, fairly well defined below 590 second-feet. Mean discharge for October estimated as in monthly table. Discharge Nov. 1–10, Dec. 3–9, Mar. 15–21, 26 and 27, Apr. 11 and 13, estimated. See remarks under "Acurracy" in station description. River practically dry Aug. 12 to Sept. 30.

Monthly discharge of Sweetwater River near Dehesa, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	.....	.....	[a] 0.05	3	D.
November	0.4	0.1	.27	16	D.
December	1.5	.4	.78	48	D.
January	302	1.0	23.8	1,460	D.
February	909	55	168	9,330	B.
March	240	37	97.6	6,000	C.
April	165	25	44.6	2,650	D.
May	1,290	51	214	13,200	D.
June	49	10	23.5	1,400	D.
July	9	.5	3.60	221	D.
August	0.5	.0	.11	7	D.
September	.0	.0	.0	.....	
The year	1,290	.0	47.4	34,300	

[a] Estimated.

Digitized by Google

SAN DIEGO RIVER BASIN.

SAN DIEGO RIVER AT DIVERTING DAM NEAR LAKESIDE, CAL.

LOCATION.—In the NE. ¼ sec. 11, T. 14 S., R. 2 E., San Diego County, at diverting-dam for San Diego flume, about 1,000 feet below mouth of Boulder Creek, and 13 miles northeast of Lakeside.

DRAINAGE AREA.—102 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1912, to September 30 1915.

GAGE.—Vertical staff fastened to upstream face of dam on left bank; read three times a day by watchman of Cuyamaca Water Co.

DISCHARGE MEASUREMENTS.—Made from cable one-fourth mile below dam or by wading.

CHANNEL AND CONTROL.—Concrete diversion dam serves as control. The channel above and below dam composed of shifting sand.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.6 feet at 7 a. m. March 20 (discharge, determined from extension of rating curve revised for this report, 2,380 second-feet); no flow over dam for several months during year, as water was diverted into San Diego flume.

1912–1915: Maximum stage recorded, 11.6 feet January 27, 1914 and March 20, 1915 (discharge from revised rating curve, 2,380 second-feet); no flow over dam for several months during each year.

DIVERSIONS.—Intake of the San Diego flume is at left end of diverting dam (see San Diego flume at diverting dam near Lakeside, pp. 40–41); no diversions above station.

REGULATION.—See Boulder Creek near Julian for amount of stored water released from Cuyamaca reservoir; capacity of reservoir, 11,400 acre-feet.

ACCURACY.—Results good for discharge over dam. Rating curve fairly well defined except for extremely high water. Total flow of San Diego River at this point is obtained by combining flow over dam, discharge through sand gates (estimated by engineers of the Cuyamaca Water Co.), and discharge of San Diego flume at diverting dam.

Discharge measurements of San Diego River at diverting dam near Lakeside, Cal., during the year ending Sept. 30, 1915.

[Made by F. C. Ebert.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Feb. 3	10.20	269
6	9.80	57

Digitized by Google

Daily discharge, in second-feet, of San Diego River over diverting dam near Lakeside, Cal., for the year ending Sept. 30, 1915.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	.....	58	319	2	126	31	1.5
2	.....	295	203	0	222	31	0
3	.....	362	146	0	287	28	0
4	.....	157	130	0	416	28	0
5	.....	83	126	0	1,520	28	0
6	.....	55	94	0	380	26	0
7	.....	33	90	0	216	24	0
8	.....	24	126	0	152	17	0
9	.....	15	69	0	117	12	2
10	.....	530	83	0	80	10	.5
11	.....	850	83	0	52	10	.....
12	.....	509	69	0	31	10	.....
13	.....	222	55	0	130	10	.....
14	.....	162	50	0	117	8.5	.....
15	.....	112	42	19	90	7	.....
16	.....	168	39	14	90	5	.....
17	.....	179	19	6	83	3	.....
18	.....	130	14	3	389	2	.....
19	.....	94	12	0	99	0	.....
20	.....	179	8.5	0	86	0	.....
21	.....	157	10	.5	69	0	.....
22	.....	104	10	174	72	2	.....
23	3.5	90	9	90	69	1	.....
24	0	112	7	168	55	0	.....
25	0	162	4.5	104	55	0	.....
26	0	99	3.5	66	50	0	.....
27	0	86	4.5	0	47	0	.....
28	0	72	10	0	42	0	.....
29	425	.....	23	0	42	0	.....
30	488	.....	8.5	152	39	0	.....
31	130	.....	7	.....	33	.....	.....

NOTE.—No flow Oct. 1 to Jan. 22 and July 11 to Sept. 30.

Monthly discharge of San Diego River over diverting dam near Lakeside, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	0	0	0.0	0	.....
November	0	0	.0	0	.....
December	0	0	.0	0	.....
January	488	0	33.8	2,080	B.
February	850	15	182	10,100	B.
March	319	3.5	60.5	3,720	B.
April	174	0	26.6	1,580	B.
May	1,520	31	170	10,500	B.
June	31	0	9.78	582	C.
July	2	0	.13	8	C.
August	0	0	.0	0	.....
September	0	0	.0	0	.....
The year	1,520	0	39.4	28,600	

Digitized by Google

Daily discharge, in second-feet, of sand gates in diverting dam near Lakeside, Cal., for the year ending Sept. 30, 1915.

Day.	Mar.	Apr.	May.	Day.	Mar.	Apr.	May.	Day.	Mar.	Apr.	May.
1	.....	11	95	11	12	8.5	94	21	11	.....	.....
2	.....	11	95	12	12	8.5	75	22	11	.....	.....
3	8.5	11	95	13	11	9	.....	23	11	.....	.....
4	12	10	97	14	11	11	.....	24	11	.....	.....
5	12	9.5	100	15	11	11	.....	25	11	.....	.....
6	12	10	97	16	11	11	.....	26	11	18	.....
7	12	10	95	17	11	11	.....	27	11	118	.....
8	12	10	95	18	11	11	.....	28	11	98	.....
9	12	9.5	95	19	11	11	.....	29	11	118	.....
10	12	9	95	20	11	41	.....	30	11	80	.....
								31	11	.....	.....

Monthly discharge of sand gates in diverting dam near Lakeside, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	0	0	0.0	0
November	0	0	.0	0
December	0	0	.0	0
January	0	0	.0	0
February	0	0	.0	0
March	12	0	10.5	646
April	118	0	22.2	1,320
May	100	0	36.4	2,240
June	0	0	.0	0
July	0	0	.0	0
August	0	0	.0	0
September	0	0	.0	0
The year	118	0	5.81	4,210

Digitized by Google

Total daily discharge, in second-feet, of San Diego River[a] at diverting dam near Lakeside, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	2.0	.....	3.0	83	349	39	224	60	16.5	8.0	8.0
2	.....	1.6	.....	2.9	312	231	36	321	60	15	6.7	8.4
3	6.0	2.3	.....	2.6	364	186	35	399	57	14.5	6.9	6.9
4	3.5	3.8	.....	2.5	159	174	34	528	57	14.5	8.7	7.6
5	1.9	4.9	.....	2.4	96	170	34	1,620	57	14	8.4	8.0
6	2.0	3.3	.....	2.4	65	138	35	492	54	12.5	8.4	6.7
7	1.7	3.3	.....	2.4	56	134	35	338	52	12	8.4	8.9
8	1.5	3.3	.....	2.4	49	170	34	277	45	10.5	8.7	8.9
9	1.1	3.3	.....	1.8	40	108	30	242	40	12.5	9.6	8.7
10	.9	3.9	.....	1.9	546	120	28	205	38	11	9.3	9.8
11	1.4	3.2	.....	2.5	851	118	26	176	38	11	9.3	9.8
12	1.9	3.3	.....	2.6	509	106	26	137	37	9.6	8.9	9.8
13	1.6	1.9	.....	2.4	229	91	27	161	35	7.3	7.8	9.8
14	1.4	2.5	.....	2.4	174	87	28	148	34	9.3	7.1	8.2
15	1.2	2.3	.....	2.4	114	79	46	121	32	8.2	7.1	8.2
16	1.3	1.3	.....	2.4	176	76	40	121	30	6.9	7.3	8.4
17	1.2	.....	.....	2.4	187	56	32	114	28	9.1	6.3	8.2
18	1.2	.....	.....	2.5	138	51	29	420	27	7.8	6.3	4.8
19	1.3	.....	.....	1.9	113	48	28	130	25	7.6	6.3	4.8
20	1.3	.....	.....	2.1	195	46	54	117	25	8.2	7.3	5.0
21	1.5	.....	.....	2.4	174	47	16.5	100	21	8.0	7.6	6.5
22	1.6	.....	.....	6.2	126	47	184	103	23	7.8	6.5	6.3
23	1.6	.....	4.3	19	117	46	100	98	23	8.2	5.8	6.3
24	1.6	.....	4.3	18	143	44	178	84	22	8.7	5.4	6.3
25	1.9	.....	3.8	12.5	192	42	114	84	22	12	6.3	6.5
26	2.3	.....	3.0	12.5	131	40	102	79	18	8.9	7.3	6.5
27	2.5	.....	3.9	15	118	42	124	76	18	8.7	4.8	6.7
28	2.0	.....	4.3	9.4	104	47	102	71	18	8.4	4.8	5.4
29	1.9	.....	3.6	434	.....	60	121	71	17.5	8.7	5.4	5.6
30	1.9	.....	3.6	498	.....	46	238	68	14	8.7	6.1	5.6
31	1.9	.....	3.3	144	.....	44	.....	62	.....	7.6	6.7	.....

[a] Includes flow over dam, through sand sluice gate, and in flume. No record on flume Oct. 1, 2, and Nov. 17 to Dec. 22. For record of flow in flume see pp. 41–43.

Total monthly discharge of San Diego River[a] at diverting dam near Lakeside, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October 3–31	6.0	0.9	1.83	105
November 1–16	4.9	1.3	2.89	92
December 23–31	4.3	3.0	3.79	68
January	498	1.8	39.3	2,420
February	851	40	199	11,100
March	349	40	98.2	6,040
April	238	16.5	65.2	3,880
May	1,620	62	232	14,300
June	60	14	34.2	2,040
July	16.5	6.9	10.1	621
August	9.6	4.8	7.21	443
September	9.8	4.8	7.35	437

[a] Includes flow over dam, through sand sluice gate, and in flume. For record of flow in flume see pp. 41–43.

SAN DIEGO RIVER AT LAKESIDE, CAL.

LOCATION.—On El Cajon grant, San Diego County, just above ford on Lakeside and Padre Barona Valley road, three-fourths mile above Cuyamaca & Eastern Railroad bridge, three-fourths mile north of Lakeside, and about a mile above mouth of San Vicente Creek.

DRAINAGE AREA.—203 square miles (measured on topographic maps).

Digitized by Google

RECORDS AVAILABLE.—December 3, 1905, to September 30, 1915.

GAGE.—Staff in three sections on left bank 100 feet above ford; read once daily by J. H. Beadle; extra readings taken during high water.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Channel composed of sand; very shifting. Both banks fairly high; overflow unusual.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.2 feet at 7 a. m. February 11 (discharge, from extension of rating curve, 2,270 second-feet); no flow for several months during the year.

1906–1915: Maximum stage recorded, gage under water at 5 a. m. March 25, 1906 (top of gage at 7.86 feet; discharge, determined from extension of rating curve, about 5,200 second-feet); no flow for long periods each year.

DIVERSIONS.—San Diego flume heads at diverting dam about 1,000 feet below Boulder Creek and about 15 miles above station. Several pumping plants 1 to 3 miles above the station obtain water for irrigation from wells along banks of stream. Cuyamaca reservoir, on the headwaters of Boulder Creek, has a capacity of 11,400 acre-feet. See also Boulder Creek near Julian.

REGULATION.—None except as noted above.

ACCURACY.—Results only fair on account of shifting channel. Daily discharge determined from fairly well defined rating curves applicable for short periods and by indirect method for shifting control.

Discharge measurements of San Diego River at Lakeside, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 29	F. C. Ebert	2.46	94	Mar. 9	F. C. Ebert	2.74	153
30	do	4.35	1,170	18	R. W. Day	2.48	66
31	do	3.16	252	26	do	2.35	46
Feb. 1	do	2.56	88	27	F. C. Ebert	2.34	44
2	do	3.26	414	31	do	2.38	45
3	K. B. Sleppy	4.08	854	Apr. 2	R. W. Day	2.33	38
5	F. C. Ebert	2.68	121	3	F. C. Ebert	2.32	37
8	K. B. Sleppy	2.19	43	9	R. W. Day	2.28	23
9	F. C. Ebert	2.14	34	May 18	F. C. Ebert	3.03	242
Mar. 3	do	3.07	252	June 21	McClung and Ellis	2.18	13
4	do	3.07	251	July 8	F. C. Ebert	2.07	.6
6	do	2.88	203	Aug. 2	do	1.81	a.1
8	Ebert and Keenan	2.80	174				

a Estimated.

Digitized by Google

Daily discharge, in second-feet, of San Diego River at Lakeside, Cal., for the year ending Sept. 30, 1915.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	.....	97	234	48	346	67	6	0.1
2	.....	280	270	42	480	66	5	.1
3	.....	905	270	34	505	64	5	.1
4	.....	290	270	32	530	63	4	.1
5	.....	126	234	30	1,290	62	3	.1
6	.....	86	217	28	580	54	2	.....
7	.....	62	217	26	410	43	1	.....
8	.....	50	200	24	410	37	.5	.....
9	.....	36	186	24	388	36	.5	.....
10	.....	252	153	24	270	28	.5	.....
11	.....	1,580	190	24	432	27	.5	.....
12	.....	608	145	24	234	26	.4	.....
13	.....	410	128	18	200	25	.4	.....
14	.....	346	112	18	200	24	.4	.....
15	.....	186	98	18	186	23	.4	.....
16	.....	171	85	37	143	17	.4	.....
17	.....	234	73	24	143	16	.4	.....
18	.....	200	71	24	234	15	.3	.....
19	.....	131	71	18	215	11	.3	.....
20	.....	143	62	13	180	14	.3	.....
21	.....	270	62	18	150	13	.3	.....
22	.....	200	53	288	135	12	.3	.....
23	.....	143	46	432	134	12	.3	.....
24	.....	131	46	186	108	11	.2	.....
25	.....	143	53	200	118	10	.2	.....
26	.....	217	46	186	117	10	.2	.....
27	.....	143	46	131	104	9	.2	.....
28	.....	119	44	157	91	8	.2	.....
29	160	.....	58	157	80	8	.2	.....
30	900	.....	57	252	78	7	.1	.....
31	270	.....	48	.....	77	.....	.1	.....

NOTE.—River dry Oct. 1 to Jan. 28 and Aug. 6 to Sept. 30.

Monthly discharge of San Diego River at Lakeside, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	0.0	0.0	0.0	0	
November	.0	.0	.0	0	
December	.0	.0	.0	0	
January	900	.0	42.9	2,640	C.
February	1,580	36	270	15,000	C.
March	270	44	124	7,620	C.
April	432	13	84.6	5,030	D.
May	1,290	77	276	17,000	D.
June	67	7	27.3	1,620	D.
July	6	.1	1.08	66	D.
August	.1	.0	.02	1	
September	.0	.0	.0	0	
The year	1,580	.0	67.6	49,000	

Digitized by Google

Combined daily discharge, in second-feet, of San Diego River and flume near Lakeside, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.3	2.8	.....	3.3	116	252	66	356	76	19	10	1.4
2	3.5	3.0	.....	3.9	300	288	60	490	75	18.5	8.1	10
3	3.8	2.8	.....	2.3	911	288	52	515	73	14.5	8.1	7.5
4	6.3	3.5	.....	2.5	295	288	50	540	74	12.5	9.9	8.5
5	2.5	4.8	.....	3.0	142	252	48	1,300	75	11	9.3	9.0
6	2.5	3.8	.....	3.2	98	236	46	587	66	11	8.2	7.2
7	2.8	3.8	.....	3.0	78	236	44	420	57	9.5	8.0	11
8	2.5	3.8	.....	2.8	71	218	42	424	53	12	8.0	8.8
9	1.6	4.6	.....	2.1	57	204	42	408	51	13	8.5	7.2
10	1.8	4.6	.....	2.2	270	171	42	292	43	14.5	10	9.0
11	1.8	3.8	.....	2.0	1,580	207	42	454	43	14	9.8	9.0
12	1.8	5.0	.....	2.2	608	162	42	256	41	13.5	9.2	9.0
13	1.8	2.3	.....	2.1	410	144	38	222	37	9.9	8.8	9.0
14	1.8	1.5	.....	2.2	346	127	38	222	36	11.5	7.2	1.9
15	1.8	1.0	.....	2.3	186	112	40	208	38	11	7.7	1.5
16	2.0	1.3	.....	2.1	171	102	58	165	31	9.9	7.0	1.9
17	2.0	1.5	.....	2.3	234	92	46	162	30	11.5	7.2	1.9
18	2.0	.3	.....	2.3	202	90	46	250	30	8.3	5.5	6.0
19	2.0	.....	.....	2.1	134	90	40	227	25	8.5	6.8	5.1
20	2.0	.....	.....	1.5	160	80	35	188	26	8.8	7.0	5.1
21	2.0	.....	.....	1.6	282	83	38	156	24	8.3	7.2	6.5
22	2.1	.....	.....	3.9	216	73	298	140	24	8.3	6.8	6.5
23	2.2	.....	.....	13	161	65	442	141	25	7.8	6.0	6.2
24	2.0	.....	3.3	16.5	152	64	196	117	24	9.2	4.9	7.0
25	2.0	.....	4.1	16.5	164	72	210	125	23	12	6.5	7.0
26	2.0	.....	4.6	14.5	238	66	201	126	21	10	8.8	7.5
27	1.8	.....	3.3	17	164	64	141	113	19	10	6.0	6.2
28	1.8	.....	3.8	12.5	137	62	166	100	18	10	5.8	3.9
29	1.8	.....	3.8	168	.....	76	165	90	18	10	5.8	4.3
30	1.8	.....	4.1	910	.....	76	264	88	21	9.3	7.0	4.3
31	2.8	.....	3.7	284	.....	66	.....	86	.....	9.9	7.2	.....

NOTE.—For record of flow in flume see pp. 41–43.

Combined monthly discharge of San Diego River and flume near Lakeside, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	6.3	1.6	2.32	143	C.
November	5.0	.0	1.81	108	C.
December	4.6	.0	.99	61	B.
January	910	1.5	48.6	2,990	C.
February	1,580	57	282	15,700	C.
March	288	62	142	8,730	C.
April	442	35	101	6,010	D.
May	1,300	86	289	17,800	D.
June	76	18	39.9	2,370	C.
July	19	7.8	11.2	689	C.
August	10	4.9	7.62	469	C.
September	11	1.4	6.31	375	C.
The year	1,580	.0	76.5	55,400	

NOTE.—For record of flow in flume see pp. 41–43.

SAN DIEGO RIVER NEAR SANTEE, CAL.

LOCATION.—At Old Mission dam in El Cajon grant, San Diego County, below Spring Canyon and just above Oak Canyon, about 4½ miles west of Santee.

DRAINAGE AREA.—375 square miles (measured on topographic maps).

Digitized by Google

RECORDS AVAILABLE.—May 25, 1912, to September 30, 1915.

GAGE.—Staff in three sections; lower section bolted to upstream face of old dam to the right of the break; other sections on left bank just above dam. Gage read daily by an employee of La Mesa Mutual Water Co.

DISCHARGE MEASUREMENTS.—Made from cable about 500 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of sand; shifting. The old dam serves as a partial control. May 10, 1913, a concrete weir, with steel plates for crest and sides, was installed at old break in dam. This weir was partly destroyed February 2, 1915.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and period 1912–1915, 13.6 feet at 10.30 a. m. February 11, 1915 (discharge, 3,960 second-feet); channel dry for several months each year, except for a small amount of ground water rising to the surface at the dam.

DIVERSIONS.—See San Diego River at Lakeside. Water for irrigation is pumped from wells along the river below Lakeside.

REGULATION.—None except as noted for station at Lakeside.

ACCURACY.—Results good except for the periods January 1 to 28 and May 30 to June 30, when the gage was read about once a week only.

Discharge measurements of San Diego River near Santee, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 22	Lee and Sleppy	8.14	17	Apr. 1	Ebert and Day	7.85	55
29	F. C. Ebert	12.26	1,050	3	F. C. Ebert	7.83	51
30	.....do	12.86	1,980	16	R. W. Day	7.37	28
31	.....do	11.30	492	May 18	F. C. Ebert	9.80	219
Feb. 3	K. B. Sleppy	11.85	931	June 21	McClung and Ellis	7.70	14
8	.....do	9.20	112	July 7	F. C. Ebert	6.77	*a*. 1
Mar. 4	F. C. Ebert	10.80	430	Aug. 1	.....do	6.30	*a*. 05
9	.....do	9.77	219				

a Estimated.

Daily discharge, in second-feet, of San Diego River near Santee, Cal., for the year ending Sept. 30, 1915.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1.....	0.1	209	738	64	515	41	16.....	.1	289	167	39	141	1
2.....	.1	1,840	660	59	830	37	17.....	.1	334	142	34	155	4
3.....	.1	1,160	450	54	970	34	18.....	.1	380	130	29	269	6
4.....	.1	570	465	51	1,320	30	19.....	.1	310	119	22	250	9
5.....	.1	332	355	45	2,120	27	20.....	.1	480	109	70	186	11
6.....	.1	250	332	39	895	20	21.....	.1	530	99	119	128	14
7.....	.1	185	289	36	615	14	22.....	16	380	89	430	104	12
8.....	.1	120	232	34	570	13	23.....	1.9	269	72	319	94	10
9.....	.1	105	206	29	465	11	24.....	1.0	215	72	430	75	8
10.....	.1	710	198	26	405	10	25.....	.5	465	72	212	66	6
11.....	.1	3,410	310	22	355	8	26.....	.2	289	64	167	58	4
12.....	.1	1,060	263	22	289	7	27.....	.1	232	64	142	66	2
13.....	.1	638	228	22	234	5	28.....	.1	198	64	109	58	.1
14.....	.1	465	196	22	202	4	29.....	1,090	.....	80	263	51	.1
15.....	.1	332	181	30	170	3	30.....	2,060	.....	72	550	48	.1
							31.....	500	.....	68	.....	44	.....

NOTE.—Discharge determined from four rating curves; the first, applicable Oct. 1 to Feb. 2, is well defined; the others, applicable Feb. 3 to Mar. 11, Mar. 12 to May 5, May 6 to Sept. 30, respectively, are fairly well defined. Practically no flow during October, November, December, July, August, and September, except the ground water which came to the surface at the dam and which amounted to about one-tenth second-foot or less.

Digitized by Google

Monthly discharge of San Diego River near Santee, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October				0	
November				0	
December				0	
January	2,060	0.1	118	7,260	A.
February	3,410	105	563	31,300	B.
March	738	64	212	13,000	C.
April	550	22	116	6,900	C.
May	2,120	44	379	23,300	C.
June	41	.1	11.7	696	D.
July				0	
August				0	
September				0	
The year				82,500	

NOTE.—For conditions during October, November, December, July, August, and September, see footnote to daily discharge table.

SAN DIEGO RIVER NEAR SAN DIEGO, CAL.

LOCATION.—At Murray Canyon ford, in Ex Mission San Diego grant, San Diego County, about 3¾ miles north of San Diego, 2½ miles above station maintained during 1913–14, and 4 miles above mouth.

DRAINAGE AREA.—431 square miles (measured on topographic maps).

RECORDS AVAILABLE.—December 20, 1914, to September 30, 1915, at present location; October 1, 1912, to December 19, 1914, at old location of station, 2½ miles downstream.

GAGE.—Vertical staff in two sections just above ford; lower section is in center of channel and upper section is on left bank. Previous gage, 2½ miles down stream, was not at same datum. Gage read twice a day by Harry Lewis; frequent readings during floods.

DISCHARGE MEASUREMENTS.—Made from highway bridge at San Diego 2½ miles below gage or by wading. New gage is read frequently when measurements are made from bridge.

CHANNEL AND CONTROL.—Bed is composed of sand and is shifting. Concrete driveway built across channel acts as a part control. Results not very satisfactory owing to collection of sand on the concrete.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.8 feet at 3 p. m. February 11 (discharge, 2,900 second-feet); no flow for several months during the year.

1912–1915: Maximum stage recorded, 16.61 feet (old gage at county bridge) at 4 p. m. February 21, 1914 (discharge, computed from extension of rating curve, 9,500 second-feet); no flow for several months each year.

DIVERSIONS.—See San Diego River near Santee. Water is also pumped from gravels in Mission Valley above station. Record at this station shows quantity of water wasted into Pacific Ocean.

REGULATION.—None except as noted for station at Lakeside.

ACCURACY.—Changes in rating curve caused by shifts in control fairly well defined by discharge measurements. Results good.

Digitized by Google

Discharge measurements of San Diego River near San Diego, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 29	Lee and McFadden	2.68	574	Apr. 19	W. D. McFadden	1.92	17
29	do	3.43	955	May 5	Isbell and McFadden	4.95	1,130
30	W. D. McFadden	5.92	2,380	20	F. C. Ebert	2.90	187
Feb. 2	Keenan and Armstrong	4.78	1,690	June 2	D. L. Lee	2.42	65
9	F. C. Ebert	2.34	107	21	McClung and Ellis	1.90	1
Mar. 9	do	3.02	250	Aug. 1	F. C. Ebert		0
Apr. 3	Ebert and Keenan	2.38	55				

Daily discharge, in second-feet, of San Diego River near San Diego, Cal., for the year ending Sept. 30, 1915.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1		390	425	55	385	74	16		405	155	17	200	12
2		1,310	740	45	530	74	17		385	145	23	165	10
3		2,120	640	40	425	74	18		365	130	26	215	2
4		1,110	465	38	555	70	19		345	120	15	250	15
5		635	425	35	1,160	63	20		310	100	8	178	1
6		400	310	40	885	55	21		740	90	5	165	.7
7		315	310	37	780	53	22		485	85	100	160	.6
8		160	280	38	535	53	23		310	80	215	160	.4
9		100	245	40	468	42	24		260	75	215	148	.3
10		590	235	37	400	36	25		345	70	185	135	.2
11		2,480	220	27	302	34	26		385	65	165	125	.1
12		1,940	210	20	285	28	27		245	60	120	118	.1
13		1,200	195	15	250	25	28		245	55	110	110	.1
14		780	185	16	215	22	29	780		65	110	103	
15		465	170	16	215	16	30	2,240		60	170	90	
							31	1,200		60		74	

NOTE.—Discharge determined from four well-defined rating curves applicable for short periods and by indirect method for shifting control. No flow Oct. 1 to Jan. 28 and June 29 to Sept. 30.

Monthly discharge of San Diego River near San Diego, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	0.0	0.0	0.0	0	
November	.0	.0	.0	0	
December	.0	.0	.0	0	
January	2,240	.0	136	8,360	A.
February	2,480	100	672	37,300	C.
March	740	55	209	12,900	C.
April	215	5	66.1	3,930	C.
May	1,160	74	316	19,400	B.
June	74	.0	25.4	1,510	C.
July	.0	.0	.0	0	
August	.0	.0	.0	0	
September	.0	.0	.0	0	
The year	2,480	.0	115	83,400	

BOULDER CREEK AT CUYAMACA RESERVOIR, NEAR JULIAN, CAL.

LOCATION.—At outlet of Cuyamaca reservoir, in Cuyamaca grant, San Diego County, 7 miles south of Julian, and 12 miles above mouth of Boulder Creek.

DRAINAGE AREA.—12.0 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 19, 1912, to September 30, 1915.

Digitized by Google

GAGE.—Vertical staff on right side of weir box, 3½ feet above weir; zero at elevation of crest of the 6-foot Cippoletti weir 100 feet below outlet gates of reservoir. Gage read daily by an employee of the Cuyamaca Water Co.

DISCHARGE MEASUREMENTS.—Made by wading 50 feet below weir. On account of velocity of approach it has been necessary to rate weir.

CHANNEL AND CONTROL.—Cippoletti weir acts as permanent control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and period 1912–1915, 0.84 foot July 24 and 25, 1915 (discharge, 18 second-feet). No water released from reservoir except when needed for San Diego flume.

WINTER FLOW.—No water is released from the reservoir during the winter season.

DIVERSIONS.—None.

REGULATION.—Flow completely regulated by operation of outlet gate of reservoir. Cuyamaca dam, completed in 1886, was one of the first earth dams built in California to store water for irrigation. The dam was originally 35 feet high, but in 1894 was enlarged, increasing the capacity of the reservoir to 11,400 acre-feet. The present dam is 635 feet long and 41½ feet high, with an inner slope of 2:1 and an outer slope of 1½:1. From the reservoir the water flows 12½ miles down the natural channel of Boulder Creek and San Diego River to the intake of San Diego flume.

ACCURACY.—Results excellent.

Discharge measurements of Boulder Creek at Cuyamaca reservoir, near Julian, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 11	F. C. Ebert	0.24	3.0	Sept. 18	F. C. Ebert	.32	3.9
Nov. 4	W. J. Isbell	.71	13.7	18	do	.43	6.0
8	do	.22	2.3				

Daily discharge, in second-feet, of Boulder Creek at Cuyamaca reservoir, near Julian, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	July.	Aug.	Sept.	Day.	Oct.	Nov.	July.	Aug.	Sept.
1	2.3	3.3	.....	3.1	7.8	16	3.0	.....	.....	6.7	4.2
2	1.4	3.3	.....	3.6	7.8	17	3.0	.....	.....	5.3	4.2
3	.0	6.2	.....	4.2	7.8	18	3.0	.....	.....	5.2	4.2
4	.0	7.4	.....	5.6	6.8	19	2.5	.....	.....	5.2	5.4
5	.0	1.2	.....	7.0	5.6	20	2.0	.....	2.1	6.5	5.4
6	.0	1.0	.....	8.3	5.6	21	1.1	.....	2.8	8.3	7.7
7	.0	1.0	.....	8.3	5.6	22	.7	.....	3.0	8.3	7.6
8	.0	1.0	.....	8.3	5.6	23	.7	.....	5.2	7.2	7.6
9	.0	.3	.....	8.3	5.6	24	1.7	.....	9.2	6.8	7.6
10	.0	.....	.....	9.4	7.6	25	2.0	.....	12	5.6	7.6
11	2.5	.....	.....	11	8.5	26	2.0	.....	3.6	6.8	6.5
12	3.3	.....	.....	11	8.6	27	2.6	.....	4.9	5.8	6.5
13	3.0	.....	.....	7.9	8.6	28	3.3	.....	6.7	5.6	6.5
14	2.3	.....	.....	7.8	7.2	29	3.3	.....	6.7	5.6	5.6
15	3.0	.....	.....	7.8	5.4	30	3.3	.....	5.8	5.6	5.6
						31	3.3	.....	4.0	6.5	.....

NOTE.—Discharge determined from a well-defined rating curve. No flow Nov. 10 to July 19.

Digitized by Google

Monthly discharge of Boulder Creek at Cuyamaca reservoir, near Julian, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	3.3	0.0	1.78	109	C.
November	7.4	.0	.82	49	C.
December	.0	.0	.0	0	
January	.0	.0	.0	0	
February	.0	.0	.0	0	
March	.0	.0	.0	0	
April	.0	.0	.0	0	
May	.0	.0	.0	0	
June	.0	.0	.0	0	
July	12	.0	2.13	131	B.
August	11	3.1	6.86	422	B.
September	8.6	4.2	6.54	389	B.
The year	12	.0	1.52	1,100	

BOULDER CREEK AT MOUTH, NEAR LAKESIDE, CAL.

LOCATION.—In the NW. ¼ sec. 12, T. 14 S., R. 2 E., San Diego County, just above junction with San Diego River, about 14 miles northeast of Lakeside.

DRAINAGE AREA.—33.5 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 12, 1912, to September 30, 1915.

GAGE.—Vertical staff, installed March 1, 1914, on right-wing wall of weir box, 300 feet above mouth of creek, at same datum as gage destroyed by the flood in January, 1914. When the station was established, a weir without end contractions was installed. The gage, which was fastened to the left side of the box, was at same elevation as crest of weir. Weir board was removed November 9, 1912, and gage readings were obtained by measuring from a reference point until January 22, 1913, when a vertical staff was installed on left bank in pool above weir box; datum 2.0 feet below original gage. Gage usually read twice a day by an employee of the Cuyamaca Water Co.

DISCHARGE MEASUREMENTS.—Made from foot plank over flume or by wading.

CHANNEL AND CONTROL.—The weir box acts as a control. Both banks are fairly high and not subject to overflow. Bed is composed of boulders, sand, and gravel.

EXTREMES OF DISCHARGE.—Maximum stage recorded 1912–1915, 5.15 feet at 6 a. m. February 11, 1915 (discharge, 200 second-feet); no flow July 2 to 8, 1914.

DIVERSIONS.—None.

REGULATION.—Water is stored at Cuyamaca Reservoir and released during low-water period. See Boulder Creek near Julian.

ACCURACY.—Results good.

Discharge measurements of Boulder Creek at mouth, near Lakeside, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 17	F. C. Ebert	1.01	2.0	May 12	McClung and Harritt	3.00	65
Feb. 3	do	2.83	66	19	do	2.50	46
6	do	1.74	20	26	do	2.05	27
Mar. 10	Day and Munday	2.10	29	June 2	do	1.82	19
17	do	1.75	19	9	do	1.62	14
24	do	1.57	13	16	do	1.48	10
31	F. C. Ebert	1.53	13	23	do	1.38	8.0
Apr. 7	R. W. Day	1.45	10	30	D. A. McClung	1.25	6.1
14	do	1.39	9.6	July 10	F. C. Ebert	1.15	4.6
21	do	1.93	27	Sept. 24	do	1.32	6.1

Digitized by Google

Daily discharge, in second-feet, of Boulder Creek at mouth, near Lakeside, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.0	3.3	1.7	2.7	40	46	11	61	21	6.0	5.2	7.8
2	3.2	3.3	1.7	2.3	92	46	10	76	19	5.6	4.8	8.4
3	4.2	3.3	2.0	2.3	86	48	10	71	20	5.4	5.0	9.4
4	3.5	3.4	1.5	2.3	38	42	9.0	81	19	5.4	5.8	9.6
5	1.8	7.8	1.5	2.5	46	40	9.4	190	18	5.0	6.2	7.4
6	1.0	3.3	1.6	2.5	19	38	10	152	16	4.7	7.8	7.4
7	1.5	2.4	1.6	2.5	14	36	9.8	134	15	4.6	7.8	7.4
8	1.5	2.2	1.6	2.6	12	34	7.4	116	15	4.4	8.0	7.4
9	1.5	2.0	1.7	2.6	10	30	9.0	104	13	4.4	7.8	7.2
10	1.4	11	1.7	3.0	76	30	8.4	92	12	4.4	7.6	7.8
11	1.5	2.1	1.7	2.6	183	34	8.0	76	12	4.1	9.4	8.2
12	2.0	2.1	3.1	2.6	110	28	8.0	68	12	4.1	9.4	8.2
13	2.2	2.0	3.0	2.5	22	25	7.8	61	12	3.8	9.0	8.2
14	2.2	1.5	2.7	2.5	42	24	8.6	54	11	3.8	7.6	8.2
15	2.4	1.5	2.9	2.6	32	21	11	46	9.8	3.8	7.6	7.8
16	2.5	1.5	2.2	2.6	30	20	9.4	42	9.6	3.5	7.4	7.0
17	2.5	1.5	2.3	2.5	34	19	8.4	40	9.0	3.4	7.0	4.7
18	1.5	1.5	8.0	2.4	26	18	8.2	46	8.6	3.2	5.4	4.7
19	1.5	1.5	4.2	2.3	22	14	7.8	44	8.6	3.1	5.4	5.0
20	1.8	1.5	4.1	2.3	34	16	7.4	40	8.2	3.1	4.7	5.0
21	1.6	1.4	3.8	2.2	42	15	13	36	8.2	3.3	5.8	5.8
22	2.0	1.4	3.2	6.8	32	15	40	32	8.0	4.4	7.0	7.0
23	1.5	1.4	3.1	6.4	28	13	40	30	7.8	5.4	7.0	6.6
24	1.2	1.5	3.5	4.2	26	13	56	28	7.4	5.8	7.2	7.0
25	1.2	1.5	3.1	4.4	42	12	34	26	7.2	17	5.8	7.4
26	1.1	1.5	2.9	5.0	32	12	28	26	7.2	6.0	5.8	7.4
27	1.0	1.6	2.8	3.6	26	12	25	24	7.0	5.0	4.8	6.6
28	1.5	1.6	2.5	4.1	23	12	24	23	6.8	7.4	6.2	6.6
29	2.1	1.6	2.8	68	.....	16	28	22	6.0	7.6	5.4	6.6
30	2.3	1.7	2.7	116	.....	13	76	22	6.2	8.0	5.0	5.4
31	3.4	.....	2.7	44	.....	12	.....	21	.....	6.8	6.2	.....

NOTE.—Discharge determined from a rating curve fairly well defined between 1 and 83 second-feet. Discharge estimated Nov. 22–30, Dec. 5–9, and interpolated Mar. 16.

Monthly discharge of Boulder Creek at mouth, near Lakeside, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	4.2	1.0	1.99	122	C.
November	11	1.4	2.46	146	C.
December	8.0	1.5	2.71	167	C.
January	116	2.2	10.2	627	B.
February	183	10	43.5	2,420	B.
March	48	12	24.3	1,490	B.
April	76	7.4	18.1	1,080	B.
May	190	21	60.8	3,740	B.
June	21	6.0	11.4	678	B.
July	17	3.1	5.24	322	B.
August	9.4	4.7	6.62	407	B.
September	9.6	4.7	7.11	423	B.
The year	190	1.0	16.0	11,600	

Digitized by Google

SAN DIEGO FLUME AT DIVERTING DAM NEAR LAKESIDE, CAL.

LOCATION.—In the SE. ¼ sec. 11, T. 14 S., R. 2 E., San Diego County, just below intake, at diverting dam about 13 miles northeast of Lakeside.

RECORDS AVAILABLE.—May 4, 1912, to September 30, 1915.

GAGE.—Sanders & Rising water-stage recorder installed at left side of flume about 500 feet below intake and a short distance above sand box; replaced December 24, 1914, by a Friez water-stage recorder.

DISCHARGE MEASUREMENTS.—Made from foot plank across flume at gage.

CHANNEL AND CONTROL.—The flume is lined with tar paper to reduce leakage. The elevation of the flume appears to vary slightly with the quantity of water flowing.

EXTREMES OF DISCHARGE.—Maximum daily discharge 1912–1915 was 51 second-feet, March 24, 1913. No flow for certain periods nearly every year.

ACCURACY.—Measurements sufficient to determine changes in the flume were made. Results good.

San Diego flume diverts water from San Diego River and water from the South Fork of San Diego River is diverted into it. The flume is 6 feet wide, 24 inches deep, and more than 30 miles long. It carries water into La Mesa reservoir, about 8 miles northeast of San Diego. This system supplied the city of San Diego with water until 1906, when the Southern California Mountain Water Co. extended its system to the city. It now supplies water for irrigating about 4,000 acres, and 7 per cent of the flow is used for domestic service. The Capitan Grande Indian Reservation has a water right of 0.8 second-feet from this flume. At the sand box, just below the gage, water is occasionally wasted into San Diego River.

Discharge measurements of San Diego flume at diverting dam near Lakeside, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 16	F. C. Ebert	0.32	1.2	Mar. 24	R. W. Day	1.63	25
16	do	.12	0	25	do	1.62	26
17	do	.36	1.5	31	F. C. Ebert	1.63	26
Dec. 23	D. A. McClung	.56	4.8	Apr. 7	R. W. Day	1.60	26
Jan. 7	do	.43	2.5	8	do	1.55	25
13	do	.43	2.3	14	do	1.10	15.6
20	do	.43	2.1	15	do	1.10	15.9
27	do	1.18	17.5	21	do	1.29	23
28	do	.87	10.5	22	do	.86	11
Feb. 6	Lee and Ebert	.92	12.0	29	Day and McClung	.51	4.1
14	W. S. Post	1.74	34	May 12	McClung and Harritt	1.68	32
17	R. W. Day	.76	8	19	do	1.65	31
18	do	.75	7.8	26	do	1.68	30
24	do	1.69	32	June 2	do	1.68	29
25	do	1.69	32	9	do	1.70	29
Mar. 3	do	1.67	31	16	do	1.59	25
4	do	1.68	32	23	do	1.48	21
10	do	1.59	26	30	D. A. McClung	1.16	13.6
11	do	1.60	26	July 10	F. C. Ebert	.97	10.8
17	do	1.60	25	Sept. 24	do	.77	6.2
18	do	1.60	24				

Digitized by Google

Daily discharge, in second-feet, of San Diego flume at diverting dam near Lakeside, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	2.0	.....	3.0	25	30	26	3.3	29	15	8.0	8.0
2	.....	1.6	.....	2.9	17.5	28	25	3.8	29	15	6.7	8.4
3	6.0	2.3	.....	2.6	1.5	32	24	17	29	14.5	6.9	6.9
4	3.5	3.8	.....	2.5	2.0	32	24	15.5	29	14.5	8.7	7.6
5	1.9	4.9	.....	2.4	12.5	32	24	3.3	29	14	8.4	8.0
6	2.0	3.3	.....	2.4	10	32	25	15.5	28	12.5	8.4	6.7
7	1.7	3.3	.....	2.4	23	32	25	27	28	12	8.4	8.9
8	1.5	3.3	.....	2.4	25	32	24	30	28	10.5	8.7	8.9
9	1.1	3.3	.....	1.8	25	27	21	30	28	10.5	9.6	8.7
10	.9	3.9	.....	1.9	16	25	19	30	28	10.5	9.3	9.8
11	1.4	3.2	.....	2.5	.6	23	17	30	28	11	9.3	9.8
12	1.9	3.3	.....	2.6	.1	25	17	31	27	9.6	8.9	9.8
13	1.6	1.9	.....	2.4	6.8	25	18	31	25	7.3	7.8	9.8
14	1.4	2.5	.....	2.4	12.5	26	16.5	31	25	9.3	7.1	8.2
15	1.2	2.3	.....	2.4	2.0	26	15.5	31	25	8.2	7.1	8.2
16	1.3	1.3	.....	2.4	8.1	26	15.5	31	25	6.9	7.3	8.4
17	1.2	.....	.....	2.4	8.1	26	15.5	31	25	9.1	6.3	8.2
18	1.2	.....	.....	2.5	7.8	26	15	31	25	7.8	6.3	4.8
19	1.3	.....	.....	1.9	19	25	17.5	31	25	7.6	6.3	4.8
20	1.3	.....	.....	2.1	16	26	13.5	31	25	8.2	7.3	5.0
21	1.5	.....	.....	2.4	17.5	26	16	31	21	8.0	7.6	6.5
22	1.6	.....	.....	6.2	22	26	10.5	31	21	7.8	6.5	6.3
23	1.6	.....	4.3	15.5	27	26	10	29	22	8.2	5.8	6.3
24	1.6	.....	4.3	18	31	26	10.5	29	22	8.7	5.4	6.3
25	1.9	.....	3.8	12.5	30	26	10.5	29	22	12	6.3	6.5
26	2.3	.....	3.0	12.5	32	26	17.5	29	18	8.9	7.3	6.5
27	2.5	.....	3.9	15	32	26	6.4	29	18	8.7	4.8	6.7
28	2.0	.....	4.3	9.4	32	26	3.5	29	18	8.4	4.8	5.4
29	1.9	.....	3.6	8.5	.....	26	2.6	29	17.5	8.7	5.4	5.6
30	1.9	.....	3.6	10	.....	26	5.7	29	14	8.7	6.1	5.6
31	1.9	.....	3.3	14.5	.....	26	.....	29	.....	7.6	6.7	.....

NOTE.—Discharge determined from three fairly well-defined rating curves, each applicable for two short periods. No record Oct. 1–2 and Nov. 17 to Dec. 22.

Monthly discharge of San Diego flume at diverting dam near Lakeside, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October 3–31	6.0	0.9	1.83	105	C.
November 1–16	4.9	1.3	2.89	92	C.
December 23–31	4.3	3.0	3.79	68	C.
January	18	1.8	5.56	342	C.
February	32	.1	16.5	916	C.
March	32	23	27.2	1,670	C.
April	26	2.6	16.4	976	C.
May	31	3.3	26.0	1,600	C.
June	29	14	24.4	1,450	C.
July	15	6.9	9.99	614	C.
August	9.6	4.8	7.21	443	D.
September	9.8	4.8	7.35	437	D.

SAN DIEGO FLUME NEAR LAKESIDE, CAL.

LOCATION.—One-half mile above trestle crossing at Los Coches Creek, about 3 miles southeast of Lakeside, San Diego County, and bout 20 miles below intake on San Diego River.

RECORDS AVAILABLE.—January 1, 1907, to September 30, 1915.

GAGE.—Sanders & Rising water-stage recorder at patrolman's cabin one-half mile above trestle. Staff gage at same site as water-stage recorder on and after July 1, 1915. Staff-gage record is mean of three readings taken each day by an employee

Digitized by Google

of the Cuyamaca Water Co. Position of gage has been changed slightly several times since the station was first established, but datum has always been same as elevation of floor of flume.

DISCHARGE MEASUREMENTS.—Made from foot plank across flume at gage.

CHANNEL AND CONTROL.—In the fall of 1914 the flume was deepened 8 inches and more tar-paper lining was put in. Although the flume is in poor condition, the maximum discharge was greater then in previous years. Elevation of flume appears to vary slightly with quantity of water flowing.

EXTREMES OF DISCHARGE.—The maximum mean daily discharge 1907–1915 was 22 second-feet April 19, 20 and May 10–16, 1915. No flow at certain times each year.

DIVERSIONS.—Water is diverted into the flume from South Fork of San Diego River, and a small quantity is diverted from this flume at Capitan Grande Indian Reservation above station.

ACCURACY.—Results good. The frequent discharge measurements indicate unstable conditions. Daily discharge computed by indirect method and from rating curves covering short periods.

See description of San Diego flume at diverting dam near Lakeside, page 40.

Discharge measurements of San Diego flume near Lakeside, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 5	F. C. Ebert	0.40	2.3	Mar. 24	R. W. Day	1.12	18.2
16	do	.36	2.1	29	F. C. Ebert	1.10	18.8
Dec. 30	D. A. McClung	.49	4.0	Apr. 1	do	1.10	18.7
Jan. 14	do	.44	2.0	7	R. W. Day	1.05	18
21	do	.41	1.5	14	do	1.11	21
27	F. C. Ebert	.84	13.6	21	do	1.10	21
30	D. A. McClung	.76	9.5	28	do	.67	8.2
31	F. C. Ebert	1.00	18.3	May 5	McClung and Harritt	.65	7
Feb. 4	Ebert and McClung	.56	4.6	12	do	1.18	22
4	F. C. Ebert	.56	4.7	18	F. C. Ebert	1.02	16.6
6	Lee and Ebert	.80	12	19	McClung and Harritt	.85	11.8
7	C. H. Lee	1.14	21	26	do	.75	8.9
10	D. A. McClung	1.16	21	June 2	do	.76	8.4
25	R. W. Day	1.19	23	9	do	.94	14.8
Mar. 3	do	1.04	18	16	do	.93	13.8
5	F. C. Ebert	1.06	18.8	21	McClung and Ellis	.85	11
10	R. W. Day	1.04	17.7	30	D. A. McClung	.92	12.4
17	do	1.19	18.7	July 8	F. C. Ebert	.90	13.3

Digitized by Google

Daily discharge, in second-feet, of San Diego flume near Lakeside, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.3	2.8	.....	3.3	18.5	18	18	10	8.5	13	10	1.4
2	3.5	3.0	.....	3.9	19.5	18	18.5	9.5	8.7	13.5	8.0	10
3	3.8	2.8	.....	2.3	6.3	18	18.5	10	8.6	9.5	8.0	7.5
4	6.3	3.5	.....	2.5	4.7	18	18	10.5	10.5	8.5	9.8	8.5
5	2.5	4.8	.....	3.0	15.5	18	18	5.2	13	8.0	9.2	9.0
6	2.5	3.8	.....	3.2	12	18.5	18	6.9	12	9.0	8.2	7.2
7	2.8	3.8	.....	3.0	16.5	18.5	18	9.6	14	8.5	8.0	11
8	2.5	3.8	.....	2.8	21	18.5	18	14	16	11.5	8.0	8.8
9	1.6	4.6	.....	2.1	21	18	18	19.5	15	12.5	8.5	7.2
10	1.8	4.6	.....	2.2	17.5	18	18.5	22	15	14	10	9.0
11	1.8	3.8	.....	2.0	.2	17	18.5	22	16	13.5	9.8	9.0
12	1.8	5.0	.....	2.2	.0	16.5	18.5	22	15	13	9.2	9.0
13	1.8	2.3	.....	2.1	.0	16	19.5	22	12	9.5	8.8	9.0
14	1.8	1.5	.....	2.2	.0	15	20.5	22	12	11	7.2	1.9
15	1.8	1.0	.....	2.3	.0	14	21.5	22	14.5	10.5	7.7	1.5
16	2.0	1.3	.....	2.1	.0	17.5	21.5	22	14	9.5	7.0	1.9
17	2.0	1.5	.....	2.3	.0	18.5	21.5	19	14	11	7.2	1.9
18	2.0	.3	.....	2.3	1.5	18.5	21.5	16	15	8.0	5.5	6.0
19	2.0	.....	.....	2.1	3.4	18.5	22	12	14	8.2	6.8	5.1
20	2.0	.....	.....	1.5	17	18.5	22	8.2	12	8.5	7.0	5.1
21	2.0	.....	.....	1.6	11.5	21	20.5	5.5	11	8.0	7.2	6.5
22	2.1	.....	.....	3.9	16.5	20	10.5	5.5	11.5	8.0	6.8	6.5
23	2.2	.....	.....	13	18	19	10.5	6.9	13	7.5	6.0	6.2
24	2.0	.....	3.3	16.5	20.5	18	10	8.7	13	9.0	4.9	7.0
25	2.0	.....	4.1	16.5	20.5	18.5	10	6.9	13	12	6.5	7.0
26	2.0	.....	4.6	14.5	20.5	19.5	15	9.2	11	10	8.8	7.5
27	1.8	.....	3.3	17	20.5	18.5	10	9.0	10	10	6.0	6.2
28	1.8	.....	3.8	12.5	18	18	9.4	9.1	10	10	5.8	3.9
29	1.8	.....	3.8	7.5	.....	18	8.1	9.7	10	9.8	5.8	4.3
30	1.8	.....	4.1	9.7	.....	18.5	12	9.6	14	9.2	7.0	4.3
31	2.8	.....	3.7	14	.....	18.5	.....	9.5	.....	9.8	7.2	.....

NOTE.—See "Accuracy" in station description. Discharge Oct. 1-2 and Dec. 31 interpolated. No record Nov. 19 to Dec. 23; probably no flow.

Monthly discharge of San Diego flume near Lakeside, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	6.3	1.6	2.32	143	C.
November	5.0	.0	1.81	108	C.
December	4.6	.0	.99	61	
January	17	1.5	5.68	349	B.
February	21	.0	11.4	633	B.
March	21	14	18.0	1,110	B.
April	22	8.1	16.8	1,000	B.
May	22	5.2	12.7	781	B.
June	16	8.5	12.5	744	B.
July	14	7.5	10.1	621	B.
August	10	4.9	7.61	468	C.
September	11	1.4	6.31	375	C.
The year	22	.0	8.84	6,390	

Digitized by Google

SOUTH FORK OF SAN DIEGO RIVER NEAR ALPINE, CAL.

LOCATION.—In the NE. ¼ sec. 10, T. 15 S., R. 2 E., in Capitan Grande Indian Reservation, San Diego County, about half a mile above junction with San Diego River, and 4 miles north of Alpine.

DRAINAGE AREA.—44.5 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 1, 1913, to September 30, 1915, when station was discontinued.

GAGE.—Sanders & Rising water-stage recorder on left bank about 100 feet below intake of South Fork flume. Vertical staff fastened to outside of gage well was read during practically the entire season by patrolman of Cuyamaca Water Co., as the water-stage recorder was not operating satisfactorily.

DISCHARGE MEASUREMENTS.—Made from bridge 1,500 feet below gage or by wading.

CHANNEL AND CONTROL.—Solid rock and gravel; rough.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and period 1913–1915, 5.0 feet during morning of February 11, 1915 (discharge, 242 second-feet); no flow during several months each year.

DIVERSIONS.—South Fork flume, which heads above the station, diverts water into San Diego flume.

REGULATION.—None.

ACCURACY.—Rating curve fairly well defined, but the gage-height record not complete. Water-stage recorder was in operation only for a few days during the season. Daily discharge, for periods not covered by gage heights, estimated by comparison with records of flow at adjacent stations. Results fair.

Discharge measurements of South Fork of San Diego River near Alpine, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 3	F. C. Ebert	2.30	38	Mar. 18	R. W. Day	.....	.0
6	do	.7	a 1	25	do	.....	.0

a Estimated.

Daily discharge, in second-feet, of South Fork of San Diego River near Alpine, Cal. for the year ending Sept. 30, 1915.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	.....	15	105	0.0	44	0.1	16	.....	30	1.5	0.0	0.8	0.1
2	.....	40	113	.0	25	.1	17	.....	40	.0	.0	.2	.....
3	.....	35	71	.0	9.5	.1	18	.....	35	.0	.0	3.5	.....
4	.....	5	39	.0	24	.1	19	.....	20	.0	.0	.4	.....
5	.....	.7	24	.0	146	.1	20	.....	24	.0	.0	.2	.....
6	.....	.5	21	.0	71	.1	21	0.1	44	.0	.0	.0	.....
7	.....	.5	24	.0	39	.1	22	.5	24	.0	.0	.0	.....
8	.....	.5	7.5	.7	18	.1	23	.0	24	.4	9.5	.0	.....
9	.....	.5	.5	.0	14	.1	24	.0	20	1	14	.0	.....
10	.....	4.4	6	.0	9.5	.1	25	.0	16	1	5	.0	.....
11	.....	217	3.5	.0	3.5	.1	26	.0	12	1	.5	.1	.....
12	.....	75	4.5	.0	1.5	.1	27	.0	11	1	.0	.0	.....
13	.....	50	3.5	.0	.5	.1	28	.1	10	1	.0	.0	.....
14	.....	40	2.5	.0	.2	.1	29	20	.....	1	.0	.0	.....
15	.....	25	2.5	.0	1.5	.1	30	146	.....	1	44	.0	.....
							31	24	.....	.5	.....	.0	.....

NOTE.—See "Accuracy" in station description. River dry Oct. 1 to Jan. 20 and June 17 to Sept. 30.

Digitized by Google

Monthly discharge of South Fork of San Diego River near Alpine, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	0.0	0.0	0.0	0	
November	.0	.0	.0	0	
December	.0	.0	.0	0	
January	146	.0	6.15	378	D.
February	217	.5	29.3	1,630	D.
March	113	.0	14.1	867	C.
April	44	.0	2.46	146	C.
May	146	.0	13.3	818	C.
June	.1	.0	.05	3	
July	.0	.0	.0	0	
August	.0	.0	.0	0	
September	.0	.0	.0	0	
The year	217	.0	5.30	3,840	

SOUTH FORK FLUME NEAR ALPINE, CAL.

LOCATION.—In the NE. ¼ sec. 10, T. 15 S., R. 2 E., in Capitan Grande Indian Reservation, San Diego County, 100 feet below diversion dam, about half a mile above mouth of South Fork of San Diego River and 4 miles north of Alpine.

RECORDS AVAILABLE.—January 10, 1913, to September 30, 1915, when station was discontinued.

GAGE.—Sanders & Rising water-stage recorder on left side of flume 100 feet below intake. Vertical staff fastened to flume at same site is read occasionally by patrolman of the Cuyamaca Water Co.

DISCHARGE MEASUREMENTS.—Made from foot plank across flume at gage.

CHANNEL AND CONTROL.—As gage is only a short distance above wasteway, the velocity depends largely on position of this gate.

EXTREMES OF DISCHARGE.—The maximum discharge of the flume, 1913–1915, was 28 second-feet May 10 and 11, 1915.

ACCURACY.—Current-meter measurements frequent, but owing to changes in the opening of the wasteway they do not determine a well-defined curve; daily discharge for greater part of year computed by indirect method for shifting control. Record from staff gage readings except February 7–10, March 4 to May 12, and June 2–23. Results fair.

South Fork flume is a feeder for San Diego flume. When water is not needed it is wasted into South Fork of San Diego River a short distance below gage in flume.

Digitized by Google

Discharge measurements of South Fork flume near Alpine, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 3	D. A. McClung	1.20	[a] 8.7	Apr. 22	R. W. Day	0.56	12.9
6	F. C. Ebert	.65	7.6	28	Day and McClung	.98	16.2
7	do	.89	8.6	May 5	McClung and Harritt	[b] .45	24
18	R. W. Day	.70	10.2	12	do	[c] 1.50	27
25	do	.97	9.7	19	do	[d] 1.43	23
Mar. 4	do	.78	12.1	26	do	[e] 1.15	17.7
11	do	1.18	23	June 2	do	.94	14.7
18	do	1.10	15.8	9	do	[e] .78	10.2
25	do	.60	8.1	16	do	[e] .67	8.3
31	F. C. Ebert	.73	9.8	23	do	.60	6.0
Apr. 7	R. W. Day	.60	8.4	30	D. A. McClung	.45	3.6
14	do	.80	10.4	July 10	F. C. Ebert	.40	2.6

[a] Does not give flow past gage because made from bridge 1,000 feet below gage and below spillway.
[b] Waste gate inside of flume about 20 feet below gage partly open; sand gate in dam open; large flow in river; "Head gate dam full of water."
[c] Waste gate partly open; sand gate in dam open.
[d] Waste gate partly open; sand gate in dam partly open.
[e] Waste gate partly open.

Daily discharge, in second-feet, of South Fork flume near Alpine, Cal., for the year ending Sept. 30, 1915.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	0.0	16	14	10.5	16	15	3.8	0.3
2	.0	18	12.5	10	19	15	3.6	.3
3	.0	19.5	15.5	10.5	20	14	3.7	.3
4	.0	15	14.5	8.0	24	14	3.5	.3
5	.0	11	20	8.1	24	13.5	3.4	.2
6	.01	8.9	20	8.2	25	13	3.3	.2
7	.01	8.4	21	8.4	26	12	3.0	.2
8	.01	6.4	22	7.2	27	10.5	2.7	.1
9	.01	6.8	23	7.0	27	9.5	2.3	.1
10	.01	8.4	23	6.8	28	9.6	2.1	.0
11	.03	16	22	6.4	28	9.8	1.3	.0
12	.05	15	23	6.0	27	9.1	.5	.0
13	.05	14	25	5.6	27	8.9	.5	.0
14	.05	13	19	6.7	24	8.8	.5	.0
15	.05	12	13	10.5	24	8.6	.4	.0
16	.05	11	13.5	10.5	24	7.9	.4	.0
17	.05	10	16	10	22	7.4	.3	.0
18	.05	10	14	11	22	6.8	.3	.0
19	.0	12	12.5	12	24	6.6	.2	.0
20	.0	14	11.5	13	21	6.2	.2	.0
21	1.0	15	12	13	19	5.9	.2	.0
22	3.7	12.5	13	13	18	5.7	.2	.0
23	.6	18	13.5	17	17.5	5.6	.2	.0
24	.4	14	12	16	17	5.6	.3	.0
25	.4	10	8.7	15	17.5	5.0	.4	.0
26	.2	19.5	9.0	16.5	17.5	4.6	.5	.0
27	1.8	16	8.8	16.5	17	4.0	.4	.2
28	1.9	13	9.2	16	16	3.5	.3	.1
29	2.0	.....	10	21	15	3.4	.3	.0
30	2.1	.....	10	22	15	3.4	.3	.0
31	15	.....	9.8	.....	14.5	.....	.3	.0

NOTE.—Discharge determined as follows: Jan. 1 to Feb. 5, from poorly-defined rating curve; July 11 to Aug. 28, from fairly well-defined rating curve. See "Accuracy" in station description. No flow Oct. 1 to Dec. 31 and Sept. 1-30.

Digitized by Google

Monthly discharge of South Fork of San Diego flume near Alpine, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	0.0	0.0	0.0	0	
November	.0	.0	.0	0	
December	.0	.0	.0	0	
January	15	.0	.953	59	D.
February	19.5	6.4	13.0	722	D.
March	25	8.7	15.2	935	C.
April	22	5.6	11.4	678	C.
May	28	14.5	21.4	1,320	C.
June	15	3.4	8.43	502	C.
July	3.8	.2	1.27	78	D.
August	.3	.0	.07	4	D.
September	.0	.0	.0	0	
The year	28	.0	5.93	4,300	

SAN VICENTE CREEK AT FOSTER, CAL.

LOCATION.—In sec. 31, T. 14 S., R. 1 E., at old diversion dam, San Diego County, about three-eighths of a mile above Foster.

DRAINAGE AREA.—74.9 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 29 to April 4, 1915, when station was discontinued.

GAGE.—Vertical staff in two sections fastened to solid rock on right bank about 25 feet above dam; read twice a day by A. E. Michael.

DISCHARGE MEASUREMENTS.—Made from foot bridge at Foster or by wading near gage.

CHANNEL AND CONTROL.—Sand, gravel, and rock. Concrete dam forms control.

EXTREMES OF DISCHARGE.—Maximum stage reported during the year, 6.5 feet February 11 (discharge, 1,190 second-feet); no flow for several months during the year.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Rating curve well defined. Results good for period covered by gage-height record.

Discharge measurements of San Vicente Creek at Foster, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 29	F. C. Ebert	3.71	148	Mar. 19	R. W. Day	3.00	28
31	do	3.39	66	26	do	2.78	15
Feb. 1	do	3.23	37	27	F. C. Ebert	2.73	15
2	do	5.35	723	29	do	2.80	16
3	K. B. Sleppy	4.00	237	30	R. W. Day	2.76	13
4	F. C. Ebert	3.49	98	Apr. 2	do	2.63	11
5	do		50	4	W. E. Keenan	2.60	13
8	do		27	5	Lee and Sleppy	2.58	10
25	D. L. Lee	3.46	102	9	R. W. Day	2.52	7.8
Mar. 4	F. C. Ebert	3.44	90	May 17	F. C. Ebert	2.80	28
6	Ebert and Keenan	3.35	72	June 1	D. L. Lee	2.41	5.6
8	F. C. Ebert	3.30	66				

Digitized by Google

Daily discharge, in second-feet, of San Vicente Creek at Foster, Cal., for the year ending Sept. 30, 1915.

Day.	Jan.	Feb.	Mar.	Apr.	Day.	Jan.	Feb.	Mar.	Apr.
1	.....	37	135	12	16	.....	92	33	.....
2	.....	723	178	11	17	.....	94	30	.....
3	.....	237	102	10	18	.....	81	28	.....
4	.....	98	90	10	19	.....	74	25	.....
5	.....	50	78	.....	20	.....	96	22	.....
6	.....	40	71	.....	21	.....	89	20	.....
7	.....	30	67	.....	22	.....	78	20	.....
8	.....	27	61	.....	23	.....	69	19	.....
9	.....	20	54	.....	24	.....	62	19	.....
10	.....	438	62	.....	25	.....	104	16	.....
11	.....	783	60	.....	26	.....	84	16	.....
12	.....	332	49	.....	27	.....	64	15	.....
13	.....	115	44	.....	28	.....	64	20	.....
14	.....	89	39	.....	29	148	.....	18	.....
15	.....	90	35	.....	30	500	.....	16	.....
					31	66	.....	14	.....

NOTE.—Discharge Jan. 29 to Feb. 9, estimated from results of discharge measurements and by comparison with records of flow for San Diego River at Lakeside; Feb. 15, 16, and 27, Mar. 18, 19, 25, 27, and 31 and Apr. 3, estimated by comparison with records of flow at Lakeside.

Monthly discharge of San Vicente Creek at Foster, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
February	783	20	149	8,280	B.
March	178	14	47.0	2,890	B.

SAN DIEGUITO RIVER BASIN.

SANTA YSABEL CREEK NEAR SANTA YSABEL, CAL.

LOCATION.—At bridge on Santa Ysabel-Warner Springs road, in Santa Ysabel grant, San Diego County, about 1½ miles north of Santa Ysabel.

DRAINAGE AREA.—12.8 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 29, 1913, to September 30, 1914, when station was discontinued. Discharge measurements only for 1914–15.

GAGE.—Vertical staff fastened to left abutment of bridge.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed rock and boulders. October 5, 1913, a concrete control (Pl. III, *A*) was built across the channel just below gage.

DIVERSIONS.—A small ditch to divert water for irrigation was constructed during the summer of 1914 a short distance above station.

REGULATION.—None.

Digitized by Google

A. NOTCHED CONCRETE CONTROL ON SANTA YSABEL CREEK NEAR RAMONA, CAL.

B. CONCRETE WEIR ON SAN LUIS REY RIVER NEAR MESA GRANDE, CAL.

Digitized by Google

Digitized by Google

Discharge measurements of Santa Ysabel Creek near Santa Ysabel, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 11	F. C. Ebert	0.71	0.4	July 10	F. C. Ebert	.82	3.1
Feb. 8	W. J. Isbell	1.04	14	10	W. J. Isbell	.84	3.3
Mar. 6	F. C. Ebert	1.30	31	28	do	.76	1.0
Apr. 23	W. J. Isbell	.97	9.3	Aug. 2	do	.76	.8
May 12	do	1.50	55	6	do	.72	.6
June 2	do	1.15	24	Sept. 10	do	.82	1.8
29	do	.89	5.0				

SANTA YSABEL CREEK NEAR MESA GRANDE, CAL.

LOCATION.—In the NW. ¼ sec. 21, T. 12 S., R. 2 E., at Sutherland dam site, San Diego County, about 1 mile below Sutherland, 1½ miles above mouth of Black Canyon Creek, and 4½ miles southwest of Mesa Grande.

DRAINAGE AREA.—53.4 square miles (measured on topographic maps).

RECORDS AVAILABLE.—December 29, 1912, to September 30, 1915.

GAGE.—Friez water-stage recorder on right bank just above Sutherland dam site.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Shifting sand. A concrete control was constructed at an outcrop of bedrock 20 feet below gage. Both banks are high, covered with brush and probably not subject to overflow. Point of zero flow, zero on gage.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 4.53 feet at 12.30 a. m. February 11 (discharge, 1,040 second-feet); minimum discharge, estimated 0.2 second-foot October 1 (water-stage recorder not in operation).

1912–1915: Maximum stage recorded February 11, 1915 (see preceding paragraph); no flow October 1–2, 1913, August 12–29, and September 6–13, 1914.

DIVERSIONS.—None of any importance above station.

REGULATION.—None.

ACCURACY.—Sand occasionally collects at the artificial control and causes slight changes in stage-discharge relation. Discharge for period March 3 to September 30 determined by indirect method for shifting control and from rating curves covering short periods. Results good.

Discharge measurements of Santa Ysabel Creek near Mesa Grande, Cal., during the year ending September 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 14	D. A. McClung	0.47	3.3	June 9	W. J. Isbell	0.96	39
Jan. 18	do	.46	2.7	29	do	.81	17
25	do	.73	13	July 13	do	.66	10
Feb. 22	R. W. Day	1.40	84	20	do	.65	9.9
Mar. 8	do	1.38	100	27	do	.61	7.3
15	do	1.19	60	Aug. 3	do	.56	6.4
22	do	1.06	51	10	do	.49	3.4
Apr. 5	do	1.07	31	17	do	.49	3.4
12	do	.91	25	24	do	.47	3.4
19	do	.90	25	31	do	.46	3.2
May 11	W. J. Isbell	1.69	129	Sept. 14	do	.51	4.7
25	do	1.27	78	21	do	.45	2.9
June 1	do	1.11	63	28	do	.46	2.9

Digitized by Google

Daily discharge, in second-feet, of Santa Ysabel Creek near Mesa Grande, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.2	0.9	2.7	4.1	60	181	37	255	60	13	6.5	3
2	.5	.9	4.1	4.1	278	215	35	379	56	13	6.5	3
3	.8	1.0	3.4	4.4	227	136	34	263	55	14	6.5	3
4	1.1	.8	3.4	4.4	107	130	32	240	54	14	5	3.5
5	1.4	.7	3.6	4.8	66	120	31	540	51	14	4.5	3.5
6	1.4	.5	3.4	4.8	53	110	34	313	47	14	4.5	3.5
7	1.4	.5	3.2	4.6	45	105	36	251	44	13	3.5	3.5
8	1.4	.5	2.7	4.8	42	100	37	214	41	12	3	3.5
9	1.4	1.3	2.7	5.5	52	94	35	180	41	12	3.5	3.5
10	1.1	2.7	2.5	5.3	455	115	26	153	39	11	3.5	3.5
11	.9	2.5	3.0	3.4	571	96	27	125	38	11	3.5	2.5
12	.8	2.3	6.2	3.4	332	88	25	116	37	10	3	.5
13	.5	2.1	4.8	3.4	181	78	25	108	36	10	3	1.5
14	.5	1.9	3.2	3.6	121	69	25	101	35	10	2.5	4
15	.5	1.7	3.0	3.4	91	62	30	99	34	10	2.5	4.5
16	.5	1.5	3.2	3.4	112	62	34	81	31	10	3	4.5
17	.5	1.3	5.3	3.6	134	60	29	98	30	10	3.5	4
18	.6	1.1	6.7	3.2	130	58	27	136	29	10	3.5	1
19	.7	.8	7.6	3.2	127	57	25	103	28	10	3	3
20	.5	.7	7.6	3.2	192	53	22	96	28	9.5	3	3
21	.8	.7	5.5	3.4	130	52	60	91	27	8	3	3
22	1.3	.7	5.7	14	93	51	107	87	26	8	2	3
23	1.2	1.1	6.0	7.6	84	48	63	77	25	8	1.5	3
24	.8	1.3	5.5	5.7	112	47	69	78	23	7.5	2.5	3
25	.5	1.3	5.3	10	192	44	52	75	22	7.5	3	3
26	.4	1.4	5.3	10	136	43	44	73	21	7.5	5.5	3
27	.4	1.4	4.6	8.1	125	40	44	70	21	7.5	7	3
28	.4	1.4	3.9	26	123	40	44	66	19	6.5	4.5	3
29	.4	1.6	3.9	471	.....	42	60	66	17	6.5	4	3
30	.5	1.6	3.9	408	.....	40	182	65	16	6.5	3.5	3
31	.8	.....	4.1	78	.....	38	.....	62	.....	7	3	.....

NOTE.—Discharge, Oct. 1 to Mar. 2, determined from a fairly well-defined rating curve. See also "Accuracy" in the station description. Discharge, Oct. 1–4, Nov. 11–16, Feb. 1, and Mar. 4–7, estimated.

Monthly discharge of Santa Ysabel Creek near Mesa Grande, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1.4	0.2	0.78	48	C.
November	2.7	.5	1.27	76	C.
December	7.6	2.5	4.39	270	C.
January	471	3.2	36.2	2,230	B.
February	571	42	156	8,660	B.
March	215	38	79.8	4,910	B.
April	182	22	44.4	2,640	B.
May	540	62	150	9,220	B.
June	60	16	34.4	2,050	B.
July	14	6.5	10.0	615	B.
August	7	1.5	3.77	232	C.
September	4.5	.5	3.07	183	C.
The year	571	.2	43.0	31,100	

Digitized by Google

SANTA YSABEL CREEK NEAR RAMONA, CAL.

LOCATION.—In the NE. ¼ sec. 27, T. 12 S., R. 1 E., at Pamo, San Diego County, 1 mile below mouth of Temescal Creek, 4 miles north of Ramona, and about 5 miles above site of station maintained at mouth of canyon near Escondido from 1906 to 1910.

DRAINAGE AREA.—110 square miles (measured on topographic maps).

RECORDS AVAILABLE.—February 5, 1912, to September 30, 1915.

GAGE.—Staff in four sections on left bank (short vertical section at control read at extremely low stages); read three times each day and more frequently during floods by C. M. De Venelle.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Channel composed of sand; somewhat shifting. November 19, 1912, a concrete control was built about 30 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and period 1912–1915, 8.05 feet at 12.30 to 1.30 a. m., February 11 (discharge, 3,330 second-feet); minimum stage recorded, 0.74 foot October 1 to 7, 1914 (discharge, 0.1 second-foot).

DIVERSIONS.—None of any importance above station. Water is diverted from Santa Ysabel Creek near mouth of canyon, 5 miles below station, by East San Pasqual ditch, which takes out on left bank, and by West San Pasqual ditch, which takes out on right bank and below intake of East San Pasqual ditch.

REGULATION.—None.

ACCURACY.—Results good. The concrete control, except for short periods after high water, has proved very effective.

Discharge measurements of Santa Ysabel Creek near Ramona, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 12	F. C. Ebert	0.84	0.2	May 27	R. W. Day	1.74	64
Dec. 12	D. A. McClung	1.24	10	Apr. 2	....do	1.72	55
Jan. 14	Lee and Sleppy	1.16	5.8	9	....do	1.66	45
16	D. A. McClung	1.15	4.6	17	....do	1.61	41
17	....do	1.15	4.1	May 7	....do	3.02	326
23	....do	1.34	15	7	....do	3.06	373
24	....do	1.26	11	7	....do	2.94	315
Feb. 6	....do	1.90	90	7	....do	2.93	311
7	....do	1.82	82	8	....do	2.90	297
13	....do	3.02	277	June 1	W. J. Isbell	1.84	72
20	R. W. Day	2.23	152	July 13	....do	1.37	14
27	....do	2.17	131	Aug. 10	....do	1.15	3.9
Mar. 6	....do	2.27	157	24	....do	1.13	3.0
7	Ebert and Day	2.24	157	Sept. 16	F. C. Ebert	1.14	4.3
12	R. W. Day	2.11	119	28	W. J. Isbell	1.14	4.1
20	....do	1.87	71				

Digitized by Google

Daily discharge, in second-feet, of Santa Ysabel Creek near Ramona, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.1	1.9	4.6	5.8	151	278	56	393	74	26	9	3.5
2	.1	1.9	4.6	5.8	460	412	54	628	67	24	8.5	3.5
3	.1	1.4	4.3	5.8	365	223	55	470	70	25	8	4
4	.1	.2	3.8	7.0	170	203	52	375	69	26	8	5
5	.1	.4	4.0	7.5	115	184	55	850	67	24	8	5
6	.1	.4	4.3	7.0	88	161	60	438	66	24	7	4
7	.1	.4	4.6	6.4	76	152	55	350	60	23	6	4
8	.2	.3	4.0	5.8	67	144	52	283	62	22	5.5	3.5
9	.2	2.8	3.8	7.0	62	134	49	255	55	22	5	3.5
10	.2	18	4.3	7.5	1,080	172	44	220	54	22	4.5	3
11	.6	4.6	5.2	6.1	1,250	136	38	190	54	19	4.5	2.5
12	.5	3.4	10	5.8	510	125	38	170	52	17	4.5	1.5
13	.5	2.6	7.0	6.1	270	113	38	160	49	15	4.5	1.5
14	.4	2.4	5.5	6.1	230	106	42	140	46	14	4	4.5
15	.4	2.4	5.5	6.4	185	97	52	135	44	14	4	4
16	.4	1.8	5.5	5.8	180	88	45	125	41	14	3.5	4
17	.4	1.4	8.5	5.8	190	86	41	120	41	14	5	4
18	.5	1.3	12	5.5	135	84	38	225	42	13	6	3.5
19	.5	.7	9.0	4.9	120	84	39	145	38	12	5.5	3.5
20	.6	.6	10	4.6	203	76	38	130	38	11	5	4
21	.9	.6	9.5	5.5	198	70	138	120	37	9.5	4.5	4
22	1.4	.9	8.0	25	152	69	263	110	36	9	4	3.5
23	1.6	1.3	8.5	13	136	67	123	110	34	9	2.5	3.5
24	1.3	1.3	6.7	10	150	66	142	103	32	10	3.5	3.5
25	.9	1.2	6.4	19	278	62	88	100	32	9.5	4	5
26	.8	1.3	7.0	17	168	61	74	90	32	9.5	110	5.5
27	.7	1.4	7.0	13	142	58	67	89	32	9	20	5.5
28	.7	1.8	7.0	21	132	61	74	82	30	9	9	5
29	.7	2.0	6.7	915	.....	77	125	80	28	9	7	5
30	1.1	2.2	5.8	760	.....	64	412	79	27	9.5	3.5	4.5
31	1.6	.....	6.7	255	.....	60	.....	73	.....	9.5	3	.....

NOTE.—Discharge, except as noted below, determined from two fairly well-defined rating curves. Indirect method for shifting control used Feb. 12–19 and May 6–31.

Monthly discharge of Santa Ysabel Creek near Ramona, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1.6	0.1	0.57	35	D.
November	18	.2	2.10	125	C.
December	12	3.8	6.45	397	B.
January	915	4.6	70.2	4,320	B.
February	1,250	62	259	14,400	B.
March	412	58	122	7,500	B.
April	412	38	81.6	4,860	B.
May	850	73	221	13,600	C.
June	74	27	47.0	2,800	B.
July	26	9	15.6	959	C.
August	110	2.5	9.26	569	C.
September	5.5	1.5	3.90	232	D.
The year	1,250	.1	68.7	49,800	

SAN DIEGUITO RIVER AT BERNARDO, CAL.

LOCATION.—At highway bridge at Bernardo, in San Bernardo grant, San Diego County, 5 miles below junction of Santa Ysabel and Santa Maria creeks, and 16 miles above mouth of river.

DRAINAGE AREA.—266 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 17, 1912, to September 30, 1915.

GAGE.—Standard chain fastened to upstream side of bridge near left bank; read twice daily by S. C. Smith.

Digitized by Google

DISCHARGE MEASUREMENTS.—Made from car and cable 30 feet above gage or by wading.

CHANNEL AND CONTROL.—Composed of sand; shifting. Left bank subject to overflow at flood stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and period 1912–1915, 17.8 feet February 11 (discharge, 5,050 second-feet). Practically no flow for several months each year.

DIVERSIONS.—East and West San Pasqual ditches divert water for irrigation from the Santa Ysabel at the upper end of San Pasqual Valley (see Santa Ysabel Creek near Ramona). Water for irrigation is also pumped from wells along the river.

ACCURACY.—Discharge determined from fairly well-defined rating curves and by indirect method for shifting channels. Results fair.

Discharge measurements of San Dieguito River at Bernardo, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 26	F. C. Ebert	10.18	[a] 0.1	Mar. 27	F. C. Ebert	10.40	64
31	K. B. Sleppy	11.83	382	Apr. 6	.....do	10.50	58
Feb. 10	F. C. Ebert	14.47	[b] 1,580	10	R. W. Day	10.21	30
11	.....do	15.75	[c] 3,110	May 6	C. E. Hickok	12.52	683
12	.....do	12.81	861	17	F. C. Ebert	10.89	158
Mar. 2	.....do	12.16	470	20	.....do	11.01	156
3	.....do	11.71	368	July 6	W. E. Keenan	9.70	2.6
10	.....do	11.35	230	7	F. C. Ebert	9.67	.8

[a] Estimated.
[b] 15 second-feet of this is estimated flow through circular culvert.
[c] 25 second-feet of this is estimated flow in third channel.

Daily discharge, in second-feet, of San Dieguito River at Bernardo, Cal., for the year ending Sept. 30, 1915.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	.....	286	318	68	860	65	5	.....
2	.....	1,060	520	67	905	65	4	.....
3	.....	915	336	57	770	60	4	.....
4	.....	352	267	47	650	60	3	.....
5	.....	334	234	60	1,250	55	3	.....
6	.....	226	230	50	690	50	2.5	.....
7	.....	197	198	46	482	50	1	.....
8	.....	183	180	35	398	45	1	.....
9	.....	183	165	27	366	45	.5	.....
10	.....	1,840	186	29	303	40	.5	.....
11	.....	2,380	220	29	272	35	.5	.....
12	.....	740	170	36	242	35	.4	.....
13	.....	399	148	29	213	30	.4	.....
14	.....	318	139	42	185	30	.3	.....
15	.....	241	120	56	185	25	.3	.....
16	.....	226	112	91	172	20	.2	.....
17	.....	211	104	72	172	20	.2	.....
18	.....	211	97	56	305	20	.2	.....
19	.....	197	100	42	207	15	.1	.....
20	.....	197	92	42	155	15	.1	.....
21	.....	399	68	42	145	15	.....	.....
22	0.1	211	70	710	140	14	.....	.....
23	.1	183	64	382	130	13	.....	.....
24	.1	183	58	334	120	12	.....	.....
25	.1	241	60	242	115	11	.....	.....
26	.1	271	54	199	110	10	.....	.....
27	.1	226	57	199	100	9	.....	20
28	.1	183	48	199	95	8	.....	5
29	1,080	.....	126	303	85	7	.....	1
30	1,660	.....	100	570	75	6	.....	.5
31	432	.....	88	.....	70	.....	.....	.2

NOTE.—River practically dry Oct. 1 to Jan. 21, July 21 to Aug. 26, and Sept. 1–30.

Digitized by Google

Monthly discharge of San Dieguito River at Bernardo, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	0.0	0.0	0.0	0	
November	.0	.0	.0	0	
December	.0	.0	.0	0	
January	1,660	.0	102	6,270	C.
February	2,380	183	450	25,000	C.
March	520	48	153	9,410	C.
April	710	27	139	8,270	C.
May	1,250	70	322	19,800	C.
June	65	6	29.5	1,760	D.
July	5	.0	.88	54	D.
August	20	.0	.86	53	D.
September	.0	.0	.0	0	
The year	2,380	.0	97.4	70,600	

BLACK CANYON CREEK NEAR MESA GRANDE, CAL.

LOCATION.—In the NE. ¼ sec. 17, T. 12 S., R. 2 E., San Diego County, 1 mile above junction with Santa Ysabel Creek, and about 4 miles southwest of Mesa Grande.

DRAINAGE AREA.—15.2 square miles measured on topographic maps.

RECORDS AVAILABLE.—February 14, 1913, to September 30, 1915, when the station was discontinued. Discharge measurements only for the years ending September 30, 1913 and 1915.

GAGE.—Inclined staff on left bank.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Solid rock and boulders.

DIVERSIONS.—None.

REGULATION.—None.

Discharge measurements of Black Canyon Creek near Mesa Grande, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 18	D. A. McClung	0.37	0.6	June 29	W. J. Isbell	0.70	2.9
25	do	.80	4.8	July 13	do	.56	1.4
Feb. 22	R. W. Day	1.30	24	20	do	.50	.9
Mar. 1	do	1.72	46	27	do	.45	.6
8	do	1.25	25	Aug. 3	do	.40	.6
22	do	.95	8.9	10	do	.25	.1
29	do	1.00	11	17	do	.29	.2
Apr. 5	do	.85	6.6	24	do	.27	.1
12	do	.80	4.8	31	do	.28	.2
19	do	.79	4.1	Sept. 8	do	.30	.1
May 11	W. J. Isbell	1.44	33	14	do	.33	.4
25	do	1.15	15	21	do	.29	.4
June 1	do	.99	11	28	do	.29	.3

TEMESCAL CREEK NEAR ALMOND, CAL.

LOCATION.—In the NW. ¼ sec. 23, T. 12 S., R. 1 E., San Diego County, about 400 feet above junction with Santa Ysabel Creek, and 1½ miles south of Almond.

DRAINAGE AREA.—31.5 square miles (measured on topographic maps).

RECORDS AVAILABLE.—February 15, 1913, to September 30, 1915, when station was discontinued. (Discharge measurements only for year 1912–13.)

GAGE.—Inclined staff on right bank; read about twice a week by an employee of Volcan Land & Water Co.

Digitized by Google

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Shifting sand.

EXTREMES OF DISCHARGE.—Record too incomplete to show maximum stage during year or period; maximum mean daily discharge for year, estimated 125 second-feet February 11; minimum discharge estimated at 0.1 second-foot in October, November, and August.

Maximum mean daily discharge for period estimated at 300 second-feet February 21, 1914; practically no flow for several months each year.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Discharge for periods in which gage was not read estimated by interpolation between current-meter measurements and by comparison with the record of flow of Santa Ysabel Creek near Ramona. Results poor.

Discharge measurements of Temescal Creek near Almond, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 10	D. A. McClung	1.09	0.6	Mar. 20	R. W. Day	1.25	12
17	do	1.07	.6	Apr. 2	do	.94	6.9
24	do	1.05	.9	17	do	.71	4.5
Feb. 6	do	1.82	8.6	17	do	.71	4.4
13	do	2.48	36	June 1	W. J. Isbell	.68	8.8
20	R. W. Day	2.01	20	July 13	do	−.14	1.5
27	do	1.90	16	Aug. 10	do	−.37	.1
Mar. 6	do	1.57	23	21	do	−.31	.8
12	do	1.39	14	Sept. 28	do	−.36	.4

Daily discharge, in second-feet, of Temescal Creek near Almond, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.1	0.1	0.4	0.5	8	30	7	52	9	3.5	0.8	0.3
2	.1	.1	.5	.5	20	40	7	65	10	3.5	.8	.3
3	.1	.1	.5	.5	15	24	7	57	10	3	.7	.3
4	.1	.1	.5	.5	12	24	7	40	9	3	.7	.3
5	.1	.1	.5	.6	10	23	7	33	9	3	.6	.3
6	.1	.1	.5	.6	8.5	23	8	30	8	3	.5	.3
7	.1	.1	.5	.6	7.5	20	7	27	8	2.5	.4	.3
8	.1	.1	.5	.6	7	18	6	25	8	2.5	.3	.3
9	.1	2.0	.5	.6	7	16	6	24	7	2.5	.2	.3
10	.1	1.0	.5	.6	75	18	5	23	6	2	.1	.3
11	.1	.7	.5	.6	125	15	5	22	6	2	.1	.3
12	.1	.4	.5	.6	50	14	5	22	6	2	.1	.3
13	.1	.1	.5	.6	36	13	5	22	5	1.5	.1	.3
14	.1	.2	.5	.6	25	12	5	21	5	1.5	.1	.3
15	.2	.4	.5	.6	18	12	5	21	5	1.5	.1	.3
16	.2	.6	.5	.6	18	11	5	20	5	1.5	.1	.4
17	.2	.8	.8	.6	19	11	4.5	20	4	1	.1	.4
18	.1	1.0	1.0	.6	14	11	4	19	4	1	.1	.4
19	.1	.8	1.0	.6	12	12	4	18	4	1	.1	.4
20	.1	.7	1.0	.6	20	12	4	18	4	1	.1	.4
21	.1	.6	1.0	.7	20	12	10	18	4	1	.1	.4
22	.1	.5	1.0	2.5	15	12	15	18	4	1	.1	.4
23	.1	.4	1.0	1.5	14	11	10	17	4	1	.1	.4
24	.1	.3	1.0	.9	16	11	10	17	4	.9	.8	.4
25	.1	.2	1.0	2.0	25	11	8	16	3.5	.8	.8	.4
26	.1	.2	1.0	1.5	17	12	7	15	3.5	.8	15	.4
27	.1	.2	1.0	1.5	16	12	7	14	3.5	.8	1	.4
28	.1	.3	.9	2.0	13	11	7	13	3.5	.8	.5	.4
29	.1	.3	.8	75	.....	10	12	12	3.5	.8	.5	.4
30	.1	.4	.7	40	.....	9	40	11	3.5	.8	.4	.4
31	.1	.....	.6	12	.....	8	.....	11	.....	.8	.4	.....

Digitized by Google

Monthly discharge of Temescal Creek near Almond, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	0.2	0.1	0.11	7	
November	2.0	.1	.43	26	
December	1.0	.4	.70	43	
January	75	.5	4.88	300	D.
February	125	7	23.0	1,280	D.
March	40	8	15.4	947	D.
April	40	4	7.98	475	D.
May	65	11	23.9	1,470	D.
June	10	3.5	5.63	335	D.
July	3.5	.8	1.68	103	D.
August	15	.1	.83	51	D.
September	.4	.3	.35	21	
The year	125	.1	6.98	5,060	

GUEJITO CREEK NEAR ESCONDIDO, CAL.

LOCATION.—In northwest corner sec. 35, T. 12 S., R. 1 W., San Diego County, at highway bridge on road through San Pasqual Valley from Escondido to Ramona, one-fourth mile above junction with Santa Ysabel Creek, and about 7 miles southeast of Escondido.

DRAINAGE AREA.—27.6 square miles (measured on topographic maps).

RECORDS AVAILABLE.—February 8 to September 30, 1915, when station was discontinued.

GAGE.—Vertical staff fastened to willow tree on right bank 15 feet above bridge; read once a day by J. E. Dailey.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Composed of sand; very shifting. At high stages water overflows the highway at several points as channel at bridge is inadequate.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during year, estimated 118 second-feet February 10; no flow for several months during year.

DIVERSIONS.—A small ditch diverts water for irrigation above station.

REGULATION.—None.

ACCURACY.—Discharge determined by indirect method for shifting control and from poorly defined rating curves covering short periods. Results poor.

Discharge measurements of Guejito Creek near Escondido, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 1	K. B. Sleppy		3.5	Mar. 11	D. L. Lee	2.8	13
7	do	1.79	5.1	27	F. C. Ebert	2.53	c 1
10	F. C. Ebert	2.52	90	May 4	D. L. Lee	2.88	28
25	D. L. Lee	2.68	a 42	17	F. C. Ebert	2.77	9.2
Mar. 3	F. C. Ebert	2.86	b 23				

a 4 second-feet of total is estimated flow in second channel.
b 3 second-feet of total is estimated flow in second channel.
c Estimated.

Digitized by Google

Daily discharge, in second-feet, of Guejito Creek near Escondido, Cal., for the year ending Sept. 30, 1915.

Day.	Feb.	Mar.	Apr.	May.	June.	Day.	Feb.	Mar.	Apr.	May.	June.
1	.....	24	1	34	5	16	62	11	.5	8	2.5
2	.....	35	1	34	5	17	57	10	.5	7	2.5
3	.....	23	1	34	5	18	54	10	.5	10	1
4	.....	19	1	29	5	19	45	10	.5	7	1
5	.....	18	1	56	5	20	42	9	.5	7	1
6	.....	22	1	40	5	21	34	9	.5	7	1
7	.....	13	1	32	5	22	36	8	29	7	1
8	5	16	.5	25	2.5	23	29	8	29	5	1
9	5	15	.5	23	2.5	24	40	5	24	5	1
10	118	18	.5	22	2.5	25	43	4.5	20	5	.5
11	92	13	.5	21	2.5	26	26	2.5	20	5	.5
12	71	17	.5	15	2.5	27	28	1	12	5	.5
13	81	12	.5	14	2.5	28	28	1	12	5	.5
14	69	12	.5	13	2.5	29	.....	1	16	5	.5
15	72	11	.5	9	2.5	30	.....	1	24	5	.5
						31	.....	1	.....	5	.....

NOTE.—No flow July to September.

Monthly discharge of Guejito Creek near Escondido, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
February 8–28	118	5	49.4	2,060	D.
March	35	1	11.6	713	D.
April	29	.5	6.67	397	D.
May	56	5	16.1	990	D.
June	5	.5	2.33	139	D.
July	.0	.0	.0	0	
August	.0	.0	.0	0	
September	.0	.0	.0	0	
The period	.....	.....	.....	4,300	

WEST SAN PASQUAL DITCH NEAR ESCONDIDO, CAL.

LOCATION.—In sec. 34, T. 12 S., R. 1 W., San Diego County, at upper end of San Pasqual Valley, 800 feet below intake on Santa Ysabel Creek, about 7 miles southeast of Escondido.

RECORDS AVAILABLE.—1912 to September 30, 1915, when station was discontinued.

GAGE.—Vertical staff fastened to side of old culvert about 800 feet below head gate; read daily by J. E. Dailey.

DISCHARGE MEASUREMENTS.—Made from foot plank across ditch near gage.

CHANNEL AND CONTROL.—Considerable silt from the Santa Ysabel is deposited in the ditch and causes changes in the stage-discharge relation.

EXTREMES OF DISCHARGE.—Maximum discharge 1912–1915, 16 second-feet, February 24, 1914. No flow for several months each year.

ACCURACY.—Sufficient discharge measurements were not made to determine accurately changes in stage-discharge relation; gage-height record considered only fair. Results poor.

The intake of West San Pasqual ditch is below that of the East San Pasqual and on the opposite side of the Santa Ysabel. From January 16 to August 14, if there is not sufficient water in the stream for both ditches, the West San Pasqual may take 16 second-feet for 20 consecutive days out of each 30. This water is used for irrigation in San Pasqual Valley.

Digitized by Google

Discharge measurements of West San Pasqual ditch near Escondido, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 25	F. C. Ebert	1.93	5.3	Apr. 10	R. W. Day	2.11	5.8
Feb. 7	K. B. Sleppy	2.01	6.5	July 7	F. C. Ebert	2.27	5.5
Mar. 3	F. C. Ebert		.0	Aug. 2	do		.0
27	do	2.29	7.2				

Daily discharge, in second-feet, of West San Pasqual ditch near Escondido, Cal., for the year ending Sept. 30, 1915.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1		0	0	10	0	3.5	5
2		0	0	9	0	2	3.5
3		0	0	5.5	0	3.5	3.5
4		0	0	5.5	0	3.5	3.5
5		7.5	0	5	0	3.5	3.5
6		7	0	9	0	3.5	3
7		6.5	0	5.5	0	3.5	5
8		7	0	6.5	0	3.5	3.5
9		6.5	0	5.5	0	3.5	7
10		6.5	0	5.5	0	3	5
11		0	0	5.5	0	3.5	6
12		0	0	5.5	0	3.5	6
13		0	0	5.5	0	3.5	5
14		0	0	4.5	0	3.5	7
15		0	0	4.5	0	3.5	8
16		0	0	6.5	0	3.5	8
17		6.5	0	4.5	0	5	5
18		9	0	4.5	5	5	6
19		6.5	0	4.5	3.5	6	6
20		6.5	0	5.5	6	5	7
21		0	0	0	3.5	5	6
22		0	0	0	3.5	3.5	8
23		0	0	5.5	0	3.5	8
24		0	0	0	0	3.5	8
25	6.5	0	5.5	0	0	3.5	8
26	6.5	0	5	0	0	6	8
27	6.5	0	6	0	5	3.5	8
28	6.5	0	7	0	3.5	3.5	8
29	0	.....	7	0	6	3.5	6
30	0	.....	5	0	6	3.5	7
31	0	.....	5	.....	6	.....	0

NOTE.—Discharge determined from five poorly defined rating curves applicable for short periods, and by indirect method for shifting control from Mar. 28 to Apr. 9. Ditch dry Oct. 1 to Jan. 24 and July 31 to Sept. 30.

Digitized by Google

A. WATER-STAGE RECORDER IN WOODEN WELL AND BOX SHELTER ON SANTA MARIA CREEK NEAR RAMONA, CAL.

B. REINFORCED CONCRETE WELL AND WOODEN GAGE HOUSE ON SAN JOAQUIN RIVER AT FRIANT, CAL.

Digitized by Google

A. UPSTREAM VIEW, SHOWING CONCRETE CONTROL AND STAFF AND RECORDING GAGES.

B. DOWNSTREAM VIEW, SHOWING CONTROL, GAGES, AND CAR AND CABLE.

SANTA MARIA CREEK NEAR RAMONA, CAL.

Digitized by Google

Monthly discharge of West San Pasqual ditch near Escondido, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	0.0	0.0	0.0	0	
November	.0	.0	.0	0	
December	.0	.0	.0	0	
January	6.5	.0	.84	52	D.
February	9	.0	2.48	138	D.
March	7	.0	1.31	81	D.
April	10	.0	4.12	245	D.
May	6	.0	1.55	95	D.
June	6	2	3.80	226	D.
July	8	.0	5.85	360	D.
August	.0	.0	.0	0	
September	.0	.0	.0	0	
The year	10	.0	1.65	1,200	

SANTA MARIA CREEK NEAR RAMONA, CAL.

LOCATION.—In the SE. ¼ SE. ¼ sec. 11, T. 13 S., R. 1 W., San Diego County, 5½ miles west of Ramona, and about 7 miles below mouth of Hatfield Creek.

DRAINAGE AREA.—57.3 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 6, 1912, to September 30, 1915.

GAGE.—Friez water-stage recorder on right bank (Pl. IV, *A*) with staff in two sections on opposite bank just above control (Pl. V).

DISCHARGE MEASUREMENTS.—Made from cable (Pl. V) 100 feet below gage or by wading.

CHANNEL AND CONTROL.—Channel above and below station shifting sand. Left bank is high; right bank subject to overflow during extremely high water. Concrete control (Pl. V) installed just below gage at outcrop of solid rock. Zero flow, about stage 1.32 feet.

EXTREMES OF DISCHARGE.—Maximum stage during year and period 1912-1915, from water-stage recorder, 7.05 feet at midnight February 10, 1915 (discharge, computed from extension of rating curve, about 1,890 second-feet). No flow for several months each year.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Results good. Rating curve well defined except for extremely high stages.

Discharge measurements of Santa Maria Creek near Ramona, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 31	D. A. McClung	2.46	36	Mar. 30	R. W. Day	2.02	8.7
Feb. 5	do	2.25	17	Apr. 6	do	1.86	2.5
16	R. W. Day	2.43	31	13	do	1.53	.5
23	do	2.32	21	20	do	1.63	1.3
Mar. 2	do	2.91	113	May 6	do	2.59	47
8	F. C. Ebert	2.32	25	11	W. J. Isbell	2.25	18
9	R. W. Day	2.26	19	June 1	do	1.85	3.6
16	do	2.12	12	9	do	1.60	1.1
23	do	1.99	7				

Digitized by Google

Daily discharge, in second-feet, of Santa Maria Creek near Ramona, Cal., for the year ending Sept. 30, 1915.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	.....	0.1	0.1	35	124	6.4	192	4.3	0.2
2	.....	.1	.1	420	150	4.3	163	4.3	.2
3	0.1	.1	.1	124	41	3.4	71	5.2	.2
4	.1	.2	.1	29	35	3.4	29	4.3	.2
5	.1	.2	.1	18	29	3.4	112	3.4	.2
6	.1	.2	.1	15	29	4.3	63	3.4	.2
7	.1	.2	.1	13	25	4.3	41	2.0	.2
8	.1	.1	.1	9.2	21	2.7	25	1.5	.2
9	.1	.2	.1	11	18	2.7	18	1.0	.1
10	.1	.2	.1	382	48	2.0	18	.8	.1
11	.1	.4	.1	450	63	2.0	18	.8	.1
12	.1	.1	.1	110	18	2.0	15	.5	.1
13	.1	.1	.1	60	15	.8	13	.4	.1
14	.1	.1	.1	40	13	2.0	11	.2	.1
15	.1	.1	.1	30	15	4.3	11	.2	.1
16	.1	.2	.1	35	11	6.4	11	.2	.1
17	.1	.1	.1	41	11	2.7	11	.2	.1
18	.1	.1	.1	25	9.2	2.0	18	.2	.1
19	.1	.1	.1	29	9.2	2.0	15	.2	.....
20	.1	.1	.1	101	9.2	1.5	13	.2	.....
21	.1	.1	.1	63	9.2	18	11	.2	.....
22	.1	.1	.2	35	5.2	41	11	.2	.....
23	.1	.1	.1	29	6.4	15	11	.2	.....
24	.1	.1	.1	48	9.2	25	11	.2	.....
25	.1	.1	.1	136	5.2	11	9.2	.1	.....
26	.1	.1	.1	35	5.2	9.2	9.2	.1	.....
27	.1	.1	.1	29	6.4	4.3	6.4	.2	.....
28	.1	.1	1.0	29	7.6	13	6.4	.2	.....
29	.1	.1	860	.....	9.2	19	6.4	.2	.....
30	.1	.1	458	.....	7.6	101	5.2	.2	.....
31	.....	.1	41	.....	6.4	.....	5.2	.....	.....

NOTE.—No flow Oct. 1 to Nov. 2 and July 19 to Sept. 30. Discharge estimated Dec. 30 to Jan. 4, Feb. 11–15, June 24, 26, and 27.

Monthly discharge of Santa Maria Creek near Ramona, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	0.0	0.0	0.0	0	
November	.1	.0	.09	5	
December	.4	.1	.13	8	
January	860	.1	44.0	2,700	C.
February	450	9.2	85.0	4,720	C.
March	150	5.2	24.9	1,530	B.
April	101	.8	10.6	631	B.
May	192	5.2	31.0	1,910	B.
June	5.2	.1	1.17	70	C.
July	.2	.0	.08	5	
August	.0	.0	.0	0	
September	.0	.0	.0	0	
The year	860	.0	15.9	11,600	

Digitized by Google

SAN LUIS REY RIVER BASIN.

SAN LUIS REY RIVER [1] NEAR WARNER SPRINGS, CAL.

LOCATION.—In the NE. ¼ sec. 17, T. 10 S, R. 3 E., in San Jose del Valle grant, San Diego County, about 3½ miles above junction with West Fork of San Luis Rey River, and 4 miles northwest of Warner Springs.

DRAINAGE AREA.—35.8 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 25, 1913, to September 30, 1915, when station was discontinued.

GAGE.—Sanders & Rising water-stage recorder on left bank with staff in two sections on opposite bank.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Channel in shifting sand. A concrete control has been built across the channel just below gage, but it is not very effective on account of the accumulation of sand.

EXTREMES OF DISCHARGE.—Maximum stage during year not known, as water-stage recorder was not in operation during flood period. Maximum mean daily discharge during year (estimated at 185 second-feet), February 11; minimum stage occurred October 1 to 5, when water-stage recorder was not in operation (mean daily discharge estimated at 0.7 second-foot).

1913–1915: Maximum stage recorded, about 4.0 feet at crest of flood of January 27, 1914 (discharge, 233 second-feet); minimum stage recorded, 2.2 feet August 23 to 25, 1914 (discharge, 0.4 second-foot).

DIVERSIONS.—None.

REGULATIONS.—None.

ACCURACY.—Daily discharge determined by interpolation between measurements, from rating curves covering short periods, and by comparison with records of flow of San Luis Rey River near Mesa Grande. No gage-height record January 28 to 31 and February 10 and 11; discharge estimated as 12 per cent of the flow of San Luis Rey River near Mesa Grande. Results fair.

Discharge measurements of San Luis Rey River near Warner Springs, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 20	W. J. Isbell	2.18	1.0	May 27	W. J. Isbell	2.47	3.2
Nov. 20	do	2.17	.8	June 3	do	2.36	1.3
Dec. 9	do	2.16	1.2	10	do	2.32	1.6
Jan. 27	do	2.17	.8	24	do	2.32	1.4
Feb. 1	do	2.80	33	July 1	do	2.30	1.2
3	do	3.10	51	8	do	2.32	1.5
12	do	3.30	80	15	do	2.31	1.1
18	do	2.81	15	22	do	2.31	1.2
Mar. 4	do	2.80	32	29	do	2.30	1.1
11	do	2.72	19	Aug. 5	do	2.28	1.1
18	do	2.57	6.0	12	do	2.29	1.1
25	do	2.44	3.7	19	do	2.28	1.0
Apr. 8	do	2.32	1.8	26	do	2.28	1.1
16	do	2.28	1.8	Sept. 9	do	2.27	1.0
23	do	2.58	9.2	16	do	2.28	1.4
May 7	do	2.80	35	23	do	2.27	1.2
13	R. W. Day	2.66	11	30	do	2.28	1.2
20	W. J. Isbell	2.58	7.6				

[1] Local name Puerta la Cruz Creek.

Digitized by Google

Daily discharge, in second-feet, of San Luis Rey River near Warner Springs, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.7	0.9	1.0	1.2	33	23	3	42	2.0	1.2	1.1	1.1
2	.7	.9	1.1	1.2	126	39	3	38	1.3	1.2	1.1	1.1
3	.7	.9	1.1	1.2	51	46	3	20	1.3	1.3	1.1	1.0
4	.7	.9	1.1	1.2	14	32	2	16	1.3	1.3	1.1	1.0
5	.7	.9	1.1	1.2	8.5	30	2	62	1.4	1.4	1.1	1.0
6	.8	.9	1.2	1.2	3.5	28	1.8	45	1.4	1.4	1.1	1.0
7	.8	.9	1.2	1.2	2.0	26	1.8	40	1.5	1.5	1.1	1.0
8	.8	.9	1.2	1.2	2.0	24	1.8	43	1.5	1.5	1.1	1.0
9	.8	.9	1.2	1.2	3.5	22	1.8	46	1.6	1.5	1.1	1.0
10	.8	.9	1.2	1.2	175	20	1.8	28	1.6	1.4	1.1	1.0
11	.8	.8	1.2	1.2	185	19	1.8	26	1.6	1.3	1.1	1.1
12	.9	.8	1.2	1.2	80	17	1.8	16	1.6	1.3	1.1	1.2
13	.9	.8	1.2	.9	69	15	1.8	11	1.6	1.2	1.1	1.2
14	.9	.8	1.2	.9	54	13	1.8	11	1.5	1.1	1.1	1.3
15	.9	.8	1.2	.9	46	11	1.8	11	1.5	1.1	1.1	1.4
16	.9	.8	1.2	.9	38	9	1.8	14	1.5	1.1	1.0	1.4
17	.9	.8	1.2	.9	32	8	1.8	14	1.5	1.1	1.0	1.4
18	1.0	.8	1.2	.9	15	6	1.8	11	1.5	1.1	1.0	1.3
19	1.0	.8	1.2	.9	15	5.5	1.8	11	1.5	1.2	1.0	1.3
20	1.0	.8	1.2	.9	24	5.5	3.5	8	1.5	1.2	1.0	1.3
21	1.0	.8	1.2	.9	20	5	33	6	1.4	1.2	1.0	1.3
22	1.0	.8	1.2	8.0	18	4.5	16	6	1.4	1.2	1.0	1.2
23	1.0	.8	1.2	1.0	15	4.5	10	6	1.4	1.2	1.1	1.2
24	1.0	.9	1.2	2.0	16	4	6	6	1.4	1.2	1.1	1.2
25	1.0	.9	1.2	5.0	18	3.5	6	4	1.4	1.2	1.1	1.2
26	1.0	.9	1.2	2.0	15	3.5	5	4	1.4	1.1	1.1	1.2
27	1.0	.9	1.2	.8	13	3.5	3.5	3	1.3	1.1	1.1	1.2
28	1.0	1.0	1.2	19	11	3.5	5	2	1.3	1.1	1.1	1.2
29	1.0	1.0	1.2	175	.....	3.5	10	2	1.2	1.1	1.1	1.2
30	1.0	1.0	1.2	96	.....	3.5	20	2	1.2	1.1	1.1	1.2
31	1.0	.....	1.2	36	.....	3.5	.....	2	.....	1.1	1.1	.....

Monthly discharge of San Luis Rey River near Warner Springs, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1.0	0.7	0.89	55	D.
November	1.0	.8	.87	52	D.
December	1.2	1.0	1.18	73	C.
January	175	.8	11.8	726	D.
February	185	2.0	39.4	2,190	C.
March	46	3.5	14.2	873	C.
April	33	1.8	5.21	310	C.
May	62	2.0	17.9	1,100	C.
June	2.0	1.2	1.45	86	C.
July	1.5	1.1	1.23	76	C.
August	1.1	1.0	1.08	66	D.
September	1.4	1.0	1.17	70	D.
The year	185	.7	7.85	5,680	

Digitized by Google

SAN LUIS REY RIVER NEAR MESA GRANDE, CAL.

LOCATION.—In the NE, ¼ sec. 9, T. 11 S., R. 2 E., San Diego County, at concrete weir 1 mile below Warner dam site, 1 mile below mouth of Carrizo Creek, and about 5 miles north of Mesa Grande.

DRAINAGE AREA.—209 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1911, to September 30, 1915.

GAGE.—Barrett & Lawrence water-stage recorder on left bank just above weir, March 18, 1915, a vertical staff was installed at weir for use during low water; datum same as that of water-stage recorder. Previous to June 13, 1912, gage was just above cut-off wall at dam site. Original datum has not been maintained.

DISCHARGE MEASUREMENTS.—Made from cable about 1 mile above gage or by wading.

CHANNEL AND CONTROL.—Channel composed of sand and gravel; somewhat shifting. Concrete weir (Pl. III, *B*, p. 48) acts as control for gage.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 7.15 feet at 4 a. m. February 11 (discharge, 3,240 second-feet); minimum stage from water-stage recorder, 0.15 foot October 1 (discharge estimated, 0.7 second-foot).

1911–1915: Maximum stage recorded, 7.5 feet February 21, 1914 (discharge, 3,470 second-feet); minimum stage recorded, 0.09 foot August 31, 1914 (discharge, estimated 0.2 second-foot).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—At low stages sand collects at the weir and causes slight changes in the stage-discharge relation; extent of changes are determined by frequent discharge measurements. Results good.

Discharge measurements of San Luis Rey River near Mesa Grande, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 12	F. C. Ebert	0.20	1.5	Mar. 24	W. J. Isbell	0.74	68
24	W. J. Isbell	.21	1.1	31	do	.71	64
Nov. 16	do	.20	1.5	Apr. 9	do	.59	43
24	do	.21	1.3	28	do	.79	71
Dec. 7	do	.24	2.1	May 12	do	1.38	190
12	do	42	11	26	do	.78	81
19	do	.40	11	June 8	do	.61	49
Jan. 9	do	.39	10	30	do	.35	16
16	do	.27	4.2	July 10	do	.34	10
22	do	1.22	135	13	F. C. Ebert	.32	7.6
25	do	.82	54	22	W. J. Isbell	.26	3.9
29	do	3.12	816	27	do	.23	3.5
29	do	5.60	2,440	Aug. 4	do	.21	2.0
Feb. 2	do	5.40	2,030	9	do	.19	1.4
8	do	.75	61	16	do	.16	1.5
10	do	3.38	1,170	23	do	.17	1.5
11	do	4.18	1,420	28	do	.14	1.7
16	do	1.49	227	Sept. 11	do	.15	1.3
Mar. 7	F. C. Ebert	1.33	186	15	do	.17	1.7
15	W. J. Isbell	1.04	119	17	do	.16	1.2

Digitized by Google

Daily discharge, in second-feet, of San Luis Rey River near Mesa Grande, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.7	1.2	2.3	4.1	147	402	54	552	60	15	2.5	1.5
2	.8	1.2	2.6	3.4	1,050	492	50	605	60	15	2.5	1.5
3	.8	1.2	2.6	4.1	500	364	47	582	60	14	2	1.5
4	.8	1.2	2.6	6.0	169	303	47	605	59	13	2	1.5
5	.9	1.2	2.6	4.4	156	274	48	925	59	13	2	1.5
6	1.0	1.2	2.6	4.8	147	231	52	618	54	12	2	1.5
7	1.0	1.6	3.4	4.4	147	202	48	435	50	11	1.5	1.5
8	1.1	1.2	2.6	5.4	92	164	48	341	46	11	1.5	1.5
9	1.2	1.2	1.2	10	422	162	47	282	45	10	1.5	1.5
10	1.2	1.2	2.6	7.9	1,460	223	47	273	44	10	1.5	1.5
11	1.2	1.2	4.8	6.7	1,540	179	46	272	43	9	1.5	1.5
12	1.2	1.2	12	5.4	685	172	47	195	42	8	1.5	1.5
13	1.2	1.2	9.1	5.4	452	145	46	159	41	7.5	1.5	1.5
14	1.2	1.2	4.8	6.0	321	142	48	145	39	7	1.5	1.5
15	1.2	1.2	7.3	5.4	279	131	54	131	38	7	1.5	1.5
16	1.2	1.2	7.9	5.4	210	120	52	116	36	7	1.5	1.5
17	1.2	1.2	18	4.8	192	100	44	145	35	6	1.5	1.5
18	1.2	1.2	15	5.4	149	93	43	162	33	6	1.5	1.5
19	1.2	1.2	9.8	5.4	145	90	43	141	32	5	1.5	1.5
20	1.2	1.2	6.7	5.4	368	84	37	132	30	5	1.5	1.5
21	1.2	1.2	7.9	7.9	349	76	204	137	29	4	1.5	1.5
22	1.2	1.2	6.0	65	274	73	271	132	27	4	1.5	1.5
23	1.2	1.2	4.8	12	245	71	114	128	26	4	1.5	1.5
24	1.6	1.6	4.8	16	271	71	85	107	24	4	1.5	1.5
25	1.2	1.6	4.1	45	412	71	65	95	23	3.5	1.5	1.5
26	1.2	1.6	4.1	16	197	69	79	84	21	3.5	1.5	1.5
27	1.2	1.6	4.1	5.4	142	71	72	80	20	3.5	1.5	1.5
28	1.2	1.6	4.1	156	140	67	76	75	18	3.5	1.5	1.5
29	1.2	1.6	4.4	1,460	.....	95	106	69	17	3.5	1.5	1.5
30	1.2	1.6	3.7	800	.....	71	334	64	16	3	1.5	1.5
31	1.2	.....	3.7	303	.....	66	.....	54	.....	3	1.5	.....

NOTE.—Discharge determined from seven fairly well defined rating curves, applicable for short periods; discharge June 9 to Sept. 30 interpolated between measurements.

Monthly discharge of San Luis Rey River near Mesa Grande, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1.6	0.7	1.13	69	D.
November	1.6	1.2	1.31	78	C.
December	18	1.2	5.55	341	B.
January	1,460	3.4	96.6	5,940	B.
February	1,540	92	381	21,200	B.
March	492	66	157	9,650	B.
April	334	37	78.5	4,670	B.
May	925	54	253	15,600	C.
June	60	16	37.6	2,240	C.
July	15	3	7.45	458	C.
August	2.5	1.5	1.63	100	D.
September	1.5	1.5	1.50	89	D.
The year	1,540	.7	83.4	60,400	

SAN LUIS REY RIVER NEAR NELLIE, CAL.

LOCATION.—In the SW. ¼ NW. ¼ sec. 33, T. 10 S., R. 1 E., a short distance above intake of Escondido Mutual Water Co.'s canal, about 3½ miles above Rincon Indian Reservation, 5 miles southwest of Nellie, San Diego County, and 15 miles northeast of Escondido.

DRAINAGE AREA.—240 square miles (measured on topographic maps).

Digitized by Google

RECORDS AVAILABLE.—Discharge measurements only for the years ending September 30, 1899, 1912, 1914, and 1915; those previous to 1915 were published as miscellaneous measurements.

DISCHARGE MEASUREMENTS.—Made by wading at various sections above intake to Escondido Mutual Water Co.'s canal.

CHANNEL.—Shifting sand and boulders.

DIVERSIONS.—None.

REGULATION.—None.

Discharge measurements of San Luis Rey River near Nellie, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 11	W. J. Isbell		57	Aug. 13	W. J. Isbell		5.4
25	do		35	20	do		5.1
July 2	do		23	27	do		5.6
9	do		[a] 19	Sept. 3	do		2.9
12	F. C. Ebert		14	10	do		3.2
24	W. J. Isbell		11	17	do		6.1
29	do		9.1	24	do		4.1
Aug. 7	do		5.9	27	Ebert and Dixon		[b] 4.5

[a] Made by combining a measurement at 200 feet below intake to canal with a measurement of flow in canal.

[b] Made by diverting total flow of river into canal and measuring it by the weir in canal.

SAN LUIS REY RIVER NEAR PALA, CAL.

LOCATION.—In the NW. ¼ sec. 31, T. 9 S., R. 1 W., San Diego County, above ford on road to Sickler's mill, about 4 miles southeast of Pala.

DRAINAGE AREA.—322 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 9, 1903, to June 30, 1911. November 14, 1912, to September 30, 1915.

GAGE.—Friez water-stage recorder on left bank 600 feet above ford and staff gage in three sections at same site. Previous to September 19, 1912, records were obtained from staff gage about 50 feet above ford. November 13, 1906, original gage datum was lowered 4.66 feet; new gage above cable is at independent datum.

DISCHARGE MEASUREMENTS.—Made from cable 550 feet below water-stage recorder or by wading.

CHANNEL AND CONTROL.—Bed of river composed of sand, gravel, and boulders; shifting. An artificial control, consisting of short concrete cut-off walls between the boulders, was rebuilt across the channel just below the gage September 28, 1914. Zero flow for new control, about stage 5.7 feet.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder 12.4 feet at 3.30 a. m. February 11 (discharge determined from extension of rating curve, about 6,510 second-feet); minimum stage recorded, 5.92 feet October 1 and 12 (discharge, 3 second-feet).

1903–1915: Maximum stage recorded, 12.00 feet (original datum) at noon and at 2 p. m. March 24, 1906 (discharge determined from extension of rating curve, 22,000 second-feet); minimum stage recorded, 5.28 feet, August 6 and 7, 1907 (discharge, 0.6 second-foot). February 1 and 2, 1906, the stage was 0.1 foot (original gage datum) but the discharge was 10 second-feet.

DIVERSIONS.—Water is diverted for irrigation on the Rincon Indian Reservation. The Escondido Mutual Water Co. diverts water from San Luis Rey River about 10 miles above the station. This water, which is stored at the Escondido reservoir (capacity, 3,120 acre-feet), about 6 miles northeast of Escondido, is used for irrigation and municipal supply at Escondido and vicinity. Water is

Digitized by Google

diverted from Pauma Creek for irrigation on the Pauma Reservation and Pauma Rancho. About 1 second-foot of water is diverted above station for irrigation of orchard at Sickler's mill on left bank below station.

REGULATION.—None.

ACCURACY.—Results considered good except for extremely high stages. The high-water extension of the rating curve was made from a study of the record on San Luis Rey near Mesa Grande and the high-water curve for 1910. A change in the rating between July 9 and 13 was probably due to accumulation of sand at control.

Discharge measurements of San Luis Rey River near Pala, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 14	W. J. Isbell	5.94	3.4	Apr. 7	F. C. Ebert	6.58	95
23	do	5.97	4.0	27	W. J. Isbell	6.80	174
Nov. 6	do	5.96	3.8	May 6	W. D. McFadden	7.92	804
Dec. 22	F. C. Ebert	6.04	7.3	16	F. C. Ebert	7.07	285
Jan. 11	Lee and Sleppy	6.00	6.4	21	do	7.00	240
23	F. C. Ebert	6.30	38	July 9	W. J. Isbell	6.09	13
23	do	6.30	38	13	F. C. Ebert	6.01	12
Feb. 2	do	7.85	644	24	W. J. Isbell	5.97	6.2
13	do	7.82	648	Aug. 2	F. C. Ebert	5.97	7.2
27	do	7.08	276	Sept. 17	W. J. Isbell	5.96	6.5
Mar. 11	do	7.13	309	26	F. C. Ebert	5.97	7.1
26	do	6.70	116				

Daily discharge, in second-feet, of San Luis Rey River near Pala, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3	5	9.5	6.5	475	289	134	660	158	13	7	6.5
2	4	4.5	10	6.5	1,290	379	118	790	151	13	7	7
3	5	4.5	6	6 5	525	690	103	660	141	13	7	8
4	5	4.5	6	6.5	311	500	103	602	134	13	7	8
5	5	4.5	6	6.5	247	451	98	975	125	13	6.5	7
6	4.5	4.5	8	6.5	207	451	100	722	112	13	6.5	6
7	4	4.5	8	6	161	403	98	602	103	13	6.5	6
8	3.5	4.5	8.5	6	66	356	87	575	95	13	6	6
9	3.5	6	8.5	6	207	333	73	550	85	13	6.5	6
10	3	6	8.5	6	1,760	356	69	525	77	13	6.5	6
11	3	6	8.5	6	3,300	289	66	475	77	12	6.5	6
12	3	7.5	8.5	6	1,760	268	64	451	77	12	6.5	6
13	3	7.5	9	6	790	247	64	403	77	12	6.5	6
14	3.5	6	9	6	500	247	66	333	66	12	6.5	6.5
15	3.5	4.5	9	6	427	227	77	289	66	10	6.5	6.5
16	3.5	4.5	9	6	333	207	90	289	56	7	6	6.5
17	4	5	9.5	6	289	188	73	268	47	6	6.5	6.5
18	4	5	13	6	227	184	71	311	38	6	6.5	6.5
19	4	5	10	6	215	176	66	289	38	6	6.5	6.5
20	4.5	5	8	6	311	168	60	268	38	6.5	7	6.5
21	4.5	5	8	8	500	168	98	247	38	7	7	6.5
22	5	5	9	38	427	161	550	239	38	7	6	7
23	5	5	9	42	356	154	333	219	30	7	6.5	7
24	5	5	8	15	311	144	289	215	30	7	6.5	7
25	5	5	8	20	289	141	247	211	30	7	9	7
26	4.5	5.5	7.5	28	289	134	223	207	23	7	14	7
27	4.5	5.5	7.5	16	289	134	176	203	23	7	10	6.5
28	4.5	6	7.5	16	289	151	176	195	21	7	9	6
29	5	6	7.5	975	.....	168	207	191	18	7	7	5.5
30	5	6	7.5	1560	.....	151	356	180	15	7	5	5.5
31	5	.....	7.5	660	.....	134	.....	168	.....	7	6.5	.....

NOTE.—Discharge determined as follows: Oct. 1 to July 8 and July 13 to Sept. 30, from two rating curves well defined below 1,000 second-feet; Dec. 7–12 and July 9–12, estimated.

Digitized by Google

Monthly discharge of San Luis Rey River near Pala, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	5	3	4.18	257	C.
November	7.5	4.5	5.28	314	C.
December	13	6	8.37	515	C.
January	1,560	6	113	6,950	B.
February	3,300	66	577	32,000	B.
March	690	134	260	16,000	B.
April	550	60	144	8,570	B.
May	975	168	397	24,400	B.
June	158	15	67.6	4,020	B.
July	13	6	9.56	588	C.
August	14	5	7.03	432	C.
September	8	5.5	6.50	387	C.
The year	3,300	3	130	94,400	

SAN LUIS REY RIVER AT BONSALL, CAL.

LOCATION. In the SW. ¼ sec. 20,[1] T. 10 S., R. 3 W., at concrete highway bridge at Bonsall, San Diego County, just above Moosa Canyon, about 14 miles below gaging station near Pala, and 14 miles above mouth of river.

DRAINAGE AREA.—465 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 16, 1912, to September 30, 1915.

GAGE.—Staff in three sections on right bank 150 feet below bridge. Staff gage on left bank at bridge and at independent datum was used January 23 to March 25, 1915. Gage read twice daily by Julian Cantarini.

DISCHARGE MEASUREMENTS.—Made from bridge above gage or by wading.

CHANNEL AND CONTROL.—Composed of sand; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and period 1912–1915 7.0 feet from 7 to 9.30 a. m. February 11 (discharge, determined from extension of rating curve, about 9,000 second-feet). No flow for several months each year.

DIVERSIONS.—See San Luis Rey River near Pala. Morena ditch and Pala Indian Reservation canal divert water in the vicinity of Pala for irrigation. Water for irrigation is also pumped from wells along the river.

REGULATION.—None.

ACCURACY.—Results fair. Changes in channel are fairly well defined by frequent measurements.

Discharge measurements of San Luis Rey River at Bonsall, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height in feet.		Discharge.	Date.	Made by—	Gage height in feet.		Discharge.
		Old gage.	New gage.				Old gage.	New gage.	
				Sec.-ft.					*Sec.-ft.*
Dec. 14	F. C. Ebert	1.02	1.76	2.3	Mar. 1	F. C. Ebert	1.50	2.45	602
22	do	1.02	1.96	10	2	do	2.20	3.20	1,380
Jan. 10	Lee and Sleppy	1.02	(a)	12	11	do	1.61	2.43	312
23	F. C. Ebert	1.25	2.07	65	26	do	1.53	2.24	123
24	do	1.08	1.88	33	Apr. 7	do	1.48	2.24	101
25	do	1.22	1.91	38	17	D. L. Lee	1.46	.....	71
Feb. 1	K. B. Sleppy	1.48	.....	571	27	W. J. Isbell	1.58	.....	132
5	do	1.71	2.55	268	May 6	W. D. McFadden	1.78	2.54	943
11	F. C. Ebert	3.30	4.28	3,230	16	F. C. Ebert	1.73	2.41	237
12	do	2.48	3.65	2,220	21	do	2.06	.....	232
13	do	1.84	2.90	790	July 6	W. E. Keenan	1.23	1.82	8
14	do	1.76	2.65	616	13	F. C. Ebert	.....	.....	.7
27	do	1.43	2.40	304	Aug. 2	do	.....	.....	.0

[a] Water not flowing past gage, but rising from sand about 15 feet from channel.

[1] Section given in previous reports is in error.

Digitized by Google

Daily discharge, in second-feet, of San Luis Rey River at Bonsall, Cal., for the year ending Sept. 30, 1915.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1		1.5	11	571	602	120	610	142	28	0.4
2		1.5	11	1,100	1,020	98	900	142	14	.4
3		1.5	11	1,920	440	80	620	142	14	.4
4		1.5	12	136	725	80	515	142	14	.4
5		1.5	12	312	440	80	2,050	142	14	.4
6		1.5	12	195	388	80	1,010	120	14	.4
7		1.5	12	163	388	80	715	120	12	.3
8		1.5	12	136	388	62	680	120	10.	.3
9		1.5	12	1,500	440	62	450	120	8	.3
10		1.5	12	5,130	440	62	415	98	6	.3
11		1.5	12	7,000	341	62	500	80	4	.3
12		20	12	1,680	326	80	415	80	2	.3
13		10	12	1,020	311	80	380	80	.7	.2
14		2.5	12	609	296	98	320	80	.7	.2
15	1	3	12	492	282	98	220	62	.7	.2
16	1	4	12	341	267	98	232	62	.7	.2
17	1	5	12	300	252	98	232	45	.7	.2
18	1	6	12	162	238	80	310	45	.7	.2
19	1	7	12	113	223	80	232	45	.6	.1
20	1	8	12	162	208	80	232	45	.6	.1
21	1	9	12	440	194	120	198	45	.6	.1
22	1	10	43	341	179	600	198	45	.6	.1
23	1	10	65	224	164	232	198	45	.6	.1
24	1	10	38	224	150	198	198	45	.6	.1
25	1	10	38	1,340	135	142	198	28	.6	.05
26	1	10	38	300	120	142	198	28	.5	.05
27	1	10	38	224	98	142	170	28	.5	.05
28	1	10	38	162	98	142	170	28	.5	.05
29	1	11	3,150	.....	170	200	170	28	.5	.05
30	1	11	3,730	.....	120	400	142	28	.5	.05
31	.....	11	793	.....	120	.....	142	.....	.5	.05

NOTE.—No flow Oct. 1 to Nov. 14, and Sept. 1–30.

Monthly discharge of San Luis Rey River at Bonsall, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	0.0	0.0	0.0	0	
November	1	.0	.53	32	
December	20	1.5	6.26	385	D.
January	3,730	11	265	16,300	C.
February	7,000	113	939	52,100	C.
March	1,020	98	308	18,900	C.
April	600	62	133	7,910	C.
May	2,050	142	420	25,800	D.
June	142	28	75.3	4,480	C.
July	28	.5	4.88	300	D.
August	.4	.05	.205	13	
September	.0	.0	.0	0	
The year	7,000	.0	175	126,000	

SAN LUIS REY RIVER NEAR OCEANSIDE, CAL.

LOCATION.—In the SW. ¼ SW. ¼ sec. 13, T. 11 S., R. 5 W., opposite Oceanside pumping plant, just above ford, 1½ miles above mouth of river and about 2 miles northeast of Oceanside, San Diego County.

DRAINAGE AREA.—563 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 17, 1912, to September 30, 1915, when station was discontinued. Discharge measurements only for 1915.

GAGE.—Staff in three sections on right bank.

Digitized by Google

DISCHARGE MEASUREMENTS.—Made from concrete highway bridge three-fourths mile below gage or by wading.

CHANNEL AND CONTROL.—Composed of shifting sand.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and period 1912–1915, 4.9 feet, crest of flood of February 11, 1915 (discharge determined from extension of rating curve, about 7,000 second-feet). No flow for several months each year.

DIVERSIONS.—Several small canals divert water for irrigation in Mission Valley, above station; see San Luis Rey River at Bonsall. Water is also pumped from wells at various points in the valley. Record at this station shows amount of water wasted into Pacific Ocean.

REGULATION.—None.

ACCURACY.—Gage-height record not reliable; determinations of discharge withheld.

Discharge measurements of San Luis Rey River near Oceanside, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 14	F. C. Ebert	.....	0.0	Mar. 26	F. C. Ebert	2.06	120
Jan. 23	.....do	[a] 0.79	[b] .2	Apr. 7	.....do	2.08	88
25	.....do	[a] .82	1.8	18	D. L. Lee	1.9	56
30	.....do	.....	1,470	27	W. J. Isbell	2.23	150
Feb. 5	K. B. Sleppy	2.2	325	May 6	W. D. McFadden	3.3	1,250
14	F. C. Ebert	2.57	722	16	F. C. Ebert	2.43	222
27	.....do	2.17	296	July 6	.....do	.....	.0
Mar. 11	.....do	2.30	345				

[a] Temporary gage on left bank opposite original gage and at same datum.
[b] Estimated.

AGUA CALIENTE CREEK NEAR WARNER SPRINGS, CAL.

LOCATION.—In San Jose del Valle grant, San Diego County, about a mile northwest of Warner Springs.

DRAINAGE AREA.—19.2 square miles (measured on topographic maps).

RECORDS AVAILABLE.—February 5, 1913, to September 30, 1915, when station was discontinued. Discharge measurements only.

GAGE.—Vertical staff on left bank just above artificial control. Original gage was washed out March 6, 1914, and new gage installed March 24, 1914, at independent datum.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Shifting sand.

DIVERSIONS.—None.

REGULATION.—None.

Discharge measurements of Agua Caliente Creek near Warner Springs, Cal., during the year ending Sept. 30, 1915.

[Made by W. J. Isbell.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 16	0.35	0.2	May 22	1.50	13	Aug. 5	1.23	0.7
Jan. 1	.35	.4	July 1	1.29	2.0	12	1.23	.6
19	.42	.3	15	1.23	1.1	Sept. 3	1.21	.5
Mar. 24	[a]	9.4	22	1.23	.8	9	1.22	.4
Apr. 19	.....	1.2	29	1.25	.6	30	1.27	.5
May 7	.....	86						

[a] Gage washed out.

Digitized by Google

CANADA VERDE CREEK NEAR WARNER SPRINGS, CAL.

LOCATION.—At mouth of canyon in San Jose del Valle grant, 1½ miles southeast of Warner Springs, San Diego County.

DRAINAGE AREA.—2.8 square miles (measured on topographic maps).

RECORDS AVAILABLE.—February 5, 1913, to September 30, 1915, when station was discontinued; discharge measurements only.

GAGE.—Vertical staff on right bank at mouth of canyon.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Composed of shifting sand.

DIVERSIONS.—None.

REGULATION.—None.

Discharge measurements of Canada Verde Creek near Warner Springs, Cal., during the year ending Sept. 30, 1915.

[Made by W. J. Isbell.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 16	1.66	0.2	Apr. 3	1.64	1.7	July 22	1.15	0.7
Dec. 15	1.73	.4	19	1.45	1.4	Aug. 5	.95	.1
Jan. 1	1.70	.4	May 22	1.54	4.6	29	1.00	.2
Feb. 5	1.88	1.4	June 24	1.03	.1			

WEST FORK OF SAN LUIS REY RIVER[1] NEAR WARNER SPRINGS, CAL.

LOCATION.—In the SW. ¼ sec. 15, T. 10 S., R. 2 E., in San Jose del Valle grant, about 2¾ miles above junction with San Luis Rey River, and 7½ miles northwest of Warner Springs, San Diego County.

DRAINAGE AREA.—25.6 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 25, 1913, to September 30, 1915, when station was discontinued.

GAGE.—Sanders & Rising water-stage recorder on left bank near mouth of canyon, with staff in two sections fastened to tree on same bank about 40 feet upstream.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Bed composed of shifting sand. A concrete control has been built across channel just below gage, but accumulation of sand caused slight changes in stage-discharge relation.

EXTREMES OF DISCHARGE.—Maximum stage during year occurred February 11, when water-stage recorder was not in operation; mean daily discharge, estimated 365 second-feet. No flow during October and November.

1913–1915: Maximum stage recorded, 4.37 feet February 19, 1914 (discharge, 580 second-feet). No flow for several months each year.

DIVERSION.—None.

REGULATION.—None.

ACCURACY.—Results fair. Discharge determined by interpolation between measurements, from rating curves covering short periods, and by indirect method for shifting control. For high stages in January, February, and March, when gage-height record was missing, discharge was estimated as 25 per cent of the flow of San Luis Rey River near Mesa Grande.

[1] Local name Rincon Creek.

Digitized by Google

Discharge measurements of West Fork of San Luis Rey River near Warner Springs, Cal., during the year ending Sept. 30, 1915.

[Made by W. J. Isbell.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Dec. 12	2.13	0.4	Apr. 8	2.67	19	July 1	2.51	5.7
Jan. 8	2.18	.5	16	2.54	17	8	2.53	4.7
27	2.46	5.6	23	2.97	62	15	2.50	2.4
31	3.07	68	May 7	3.38	159	22	2.45	2.1
Feb. 4	2.99	55	10	3.24	120	29	2.41	1.5
13	3.31	106	13	3.06	79	Aug. 5	2.35	1.0
18	2.98	50	20	2.94	52	12	2.31	.6
Mar. 4	3.10	66	27	2.80	31	19	2.29	.4
11	3.03	60	June 3	2.70	22	26	2.20	*a*.06
18	2.83	37	10	2.63	20	Sept. 9	2.20	*a*.05
25	2.73	27	24	2.56	8.8	16	2.28	.2

a Float measurement; coefficient, 1.00.

Daily discharge, in second-feet, of West Fork of San Luis Rey River near Warner Springs, Cal., for the year ending Sept. 30, 1915.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.1	0.8	68	100	23	123	36	5.5	1.5	0.1
2	.2	.8	260	125	23	103	36	5.5	1	.1
3	.2	.3	125	90	23	95	22	5.5	1	.1
4	.2	.8	55	66	22	104	22	5	1	.1
5	.2	1.0	50	66	19	260	22	5	1	.1
6	.2	1.0	38	66	19	155	20	4.5	.9	.1
7	.2	.8	34	63	19	182	20	4.5	.9	.1
8	.2	.8	30	63	19	215	20	4.5	.8	.1
9	.2	.8	105	63	19	155	20	4	.8	.1
10	.5	1.0	365	63	19	145	20	4	.7	.1
11	1.0	.8	385	63	18	155	19	3.5	.7	.1
12	.5	1.0	170	63	18	105	18	3.5	.6	.1
13	.2	.8	106	63	18	95	17	3	.6	.2
14	.2	.8	80	63	17	90	17	3	.6	.2
15	.1	.8	70	57	17	85	16	2.5	.5	.2
16	.2	.3	50	57	17	75	16	2.5	.5	.2
17	.5	.8	50	57	14	130	15	2.5	.4	.2
18	.5	.8	52	39	14	150	14	2.5	.4	.2
19	.5	.8	46	39	14	85	13	2.5	.4	.2
20	.5	.8	46	38	14	55	12	2	.4	.2
21	.5	1.0	46	34	28	45	11	2	.3	.2
22	.5	8.5	46	29	80	45	10	2	.3	.2
23	2.5	5.5	46	29	64	45	9	2	.2	.2
24	1.0	5.5	46	29	93	45	9	2	.2	.2
25	.8	20	82	29	86	39	8.5	2	.1	.2
26	.8	8.5	73	24	72	38	8	2	.1	.2
27	1.0	5.5	73	24	73	33	7.5	1.5	.6	.2
28	.8	43	66	24	74	36	7	1.5	.2	.2
29	.8	365	.....	33	68	36	6.5	1.5	.1	.2
30	.8	200	.....	33	122	36	6	1.5	.1	.2
31	.3	68	.....	24	.....	36	.....	1.5	.1	.....

NOTE.—No flow Oct. 1 to Nov. 30.

Digitized by Google

Monthly discharge of West Fork of San Luis Rey River near Warner Springs, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	0.0	0.0	0.0	0	
November	.0	.0	.0	0	
December	2.5	.1	.52	32	
January	365	.3	24.1	1,480	C.
February	385	30	95.1	5,280	C.
March	125	24	52.1	3,200	B.
April	122	14	37.5	2,230	C.
May	260	33	96.6	5,940	C.
June	36	6	15.9	946	C.
July	5.5	1.5	3.06	188	D.
August	1.5	.1	.55	34	
September	.2	.1	.16	10	
The year	.385	.0	26.7	19,300	

CARRIZO CREEK NEAR WARNER SPRINGS, CAL.

LOCATION.—At mouth of canyon, near southern boundary of Valle de San Jose grant, San Diego County, 2,000 feet above junction with Susanna Creek, about 7½ miles southwest of Warner Springs.

DRAINAGE AREA.—4.9 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 24, 1913, to September 30, 1915, when station was discontinued (discharge measurements only for the year 1912–13).

GAGE.—Staff in two sections fastened to cottonwood tree on right bank; read about twice a week by hydrographer of Volcan Land & Water Co.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Bed composed of shifting sand. Timber control installed June 16, 1913.

EXTREMES OF DISCHARGE.—Maximum stage during year not known; maximum mean daily discharge, estimated at 50 second-feet February 11. Minimum stage recorded, 2.45 feet August 19 (discharge, 0.1 second-foot).

1913–1915: Maximum stage not known as record is incomplete. Maximum mean daily discharge, estimated at 68 second-feet February 21, 1914; minimum discharge, estimated 0.1 second foot each year.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Gage was read twice a week until June 30 and only on days of discharge measurements after that date. Discharge for days for which no readings were reported interpolated between measurements and estimated by comparison with record of flow of West Fork of San Luis Rey River near Warner Springs. Results poor.

Digitized by Google

Discharge measurements of Carrizo Creek near Warner Springs, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 16	W. J. Isbell	2.53	0.1	May 8	W. J. Isbell	2.80	10
Nov. 16	do	2.55	.2	14	R. W. Day	2.70	3.5
Dec. 24	do	2.60	.8	June 28	W. J. Isbell	2.58	.6
Jan. 18	do	2.57	.4	July 10	do	2.57	.3
Feb. 7	do	2.70	2.0	16	do	2.58	.3
13	do	2.93	9.2	28	do	2.53	.3
Mar. 3	do	3.05	17	Aug. 2	do	2.54	.2
6	F. C. Ebert	2.85	6.6	6	do	2.54	.3
13	W. J. Isbell	2.80	4.8	14	do	2.56	.3
26	do	2.69	2.4	19	do	2.47	.1
Apr. 7	do	2.67	2.1	Sept. 11	do	2.48	.1
17	do	2.65	1.6	29	do	2.49	.2

Daily discharge in second-feet of Carrizo Creek near Warner Springs, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.1	0.6	0.2	0.8	3	10	2.5	5	2.5	0.5	0.2	0.1
2	.1	.6	.2	.8	10	14	2	4	2.5	.5	.2	.1
3	.1	.6	.4	.5	5	17	2	3.5	2	.5	.2	.1
4	.1	.6	.6	.8	2	14	2	5	2	.5	.2	.1
5	.1	.6	.7	.8	2	10	2	13	2	.4	.3	.1
6	.1	.6	.7	.6	2	6.5	2	8	2	.4	.3	.1
7	.1	.4	.7	.4	2	6.5	2	9	2	.4	.3	.1
8	.1	.4	.7	.4	2	6	2	10	2	.4	.3	.1
9	.1	.3	1.0	.5	2	5.5	2	4	2	.3	.3	.1
10	.1	.3	1.5	.7	40	5	2	3.5	1.5	.3	.3	.1
11	.1	.2	1.0	.8	50	5	2	3.5	1.5	.3	.3	.1
12	.1	.2	.8	.7	17	5	2	3.5	1.5	.3	.3	1
13	.1	.2	.8	.7	9	5	1.5	3.5	1.5	.3	.3	.1
14	.1	.2	.8	.6	9	5	1.5	3.6	1.5	.3	.3	.1
15	.1	.2	.8	.6	9	4.5	1.5	3.5	1.5	.3	.3	.1
16	.1	.2	.8	.5	8.5	4.5	1.5	3.5	1.5	.3	.2	.1
17	.1	.2	.8	.5	8	4	1.5	3.5	1	.3	.2	.1
18	.1	.2	.8	.4	7	4	1.5	3.5	1	.3	.1	.1
19	.1	.2	.8	.4	6.5	3.5	1.5	3	1	.3	.1	.1
20	.1	.2	.8	.4	6.5	3.5	1.5	3	.9	.3	.1	.1
21	.1	.2	.8	.5	6.5	3	2	3	.9	.3	.1	.2
22	.6	.2	.8	1.5	6.5	2.5	2	3	.8	.3	.1	.2
23	.1	.2	.8	1.5	6.5	2.5	2.5	3	.8	.3	.1	.2
24	.1	.2	.8	1.5	6.5	2.5	2.5	3	.8	.3	.1	.2
25	.2	.2	.5	2.0	8.5	2.5	2.5	3	.7	.3	.1	.2
26	.3	.2	.3	.8	6.5	2.5	2.5	2.5	.7	.3	.1	.2
27	.4	.2	.5	.6	5	2.5	2.5	2.5	.6	.3	.1	.2
28	.5	.2	.8	4	4	2.5	2.5	2.5	.6	.3	.1	.2
29	.6	.2	.8	35	.....	2.5	2.5	2.5	.6	.3	.1	.2
30	.6	.2	.5	20	.....	2.5	5	2.5	.6	.3	.1	.2
31	.6	.....	.3	7	.....	2.5	.....	2.5	.....	.2	.1	.....

NOTE.—Discharge determined as follows: Dec. 10 to Apr. 29, from a fairly well-defined rating curve; for the remainder of the year, directly from current-meter measurements or by comparison with record of flow of San Luis Rey River near Warner Springs. See "Accuracy" in the station description.

Digitized by Google

Monthly discharge of Carrizo Creek near Warner Springs, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	0.6	0.1	0.20	12	
November	.6	.2	.30	18	
December	1.5	.2	.70	43	
January	35	.4	2.78	171	D.
February	50	2	8.95	497	D.
March	17	2.5	5.37	330	D.
April	5	1.5	2.10	125	D.
May	13	2.5	4.16	256	D.
June	2.5	.6	1.35	80	D.
July	.5	.2	.34	21	
August	.3	.1	.19	12	
September	.2	.1	.13	8	
The year	50	.1	2.17	1,570	

SUSANNA CREEK NEAR WARNER SPRINGS, CAL.

LOCATION.—At mouth of canyon, near southern boundary of Valle de San Jose grant, San Diego County, 1,000 feet above junction with Carrizo Creek, and about 7½ miles southwest of Warner Springs.

DRAINAGE AREA.—4.6 square miles (measured on topographic maps).

RECORDS AVAILABLE.—Febraury 1, 1913, to September 30, 1915, when station was discontinued (discharge measurements only for year 1912–13).

GAGE.—Staff bolted to upstream side of left bridge abutment; read about twice a week by hydrographer of Volcan Land & Water Co.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Bed composed of shifting sand. July 14, 1913, a plank was placed horizontally between abutments of bridge for a control.

EXTREMES OF DISCHARGE.—Maximum stage during year is not known; maximum mean daily discharge, estimated at 70 second-feet February 11. No flow October 1 to December 16.

1913–1915: Maximum stage not known as record is incomplete. Maximum mean daily discharge, estimated at 70 second-feet February 21, 1914, and February 11, 1915. No flow for several months each year.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Gage read about twice a week until June 30 and on days of discharge measurements after that date. Discharge for days on which gage was not read were estimated by interpolation or by comparison with record of flow of Carrizo Creek and West Fork of San Luis Rey River. Results poor.

Discharge measurements of Susanna Creek near Warner Springs, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 21	W. J. Isbell	0.50	0.9	May 8	W. J. Isbell	1.20	27
31	.....do	.46	.4	14	R. W. Day	.87	13
Jan. 8	.....do	.47	.4	June 28	W. J. Isbell	.54	2.6
18	.....do	.47	.4	July 10	.....do	.50	1.2
Feb. 7	.....do	.67	5.8	16	.....do	.47	.9
13	.....do	.99	18	28	.....do	.46	.7
Mar. 3	.....do	.80	10	Aug. 2	.....do	.46	.4
6	F. C. Ebert	.86	11	6	.....do	.45	.7
13	W. J. Isbell	.79	10	14	.....do	.44	.5
26	.....do	.66	5.5	Sept. 11	.....do	.39	.1
Apr. 7	.....do	.59	4.3	29	.....do	.40	.1
17	.....do	.56	4.2				

Digitized by Google

Daily discharge, in second-feet, of Susanna Creek near Warner Springs, Cal., for the year ending Sept. 30, 1915.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	0.4	8	10	6	15	6.5	2	0.4	0.2
2	.....	.4	25	12	5	12	6.5	2	.4	.2
3	.....	.4	16	10	5	11	6	2	.4	.2
4	.....	.4	11	10	5	15	6	2	.5	.2
5	.....	.4	9	11	5	30	6	1.5	.6	.2
6	.....	.4	7	11	5	20	6	1.5	.7	.2
7	.....	.4	6	11	4.5	23	6	1.5	.7	.2
8	.....	.4	5	12	4.5	27	5.5	1	.7	.1
9	.....	.4	5	13	4	15	5	1	.6	.1
10	.....	.4	55	13	4	10	5	1	.6	.1
11	.....	.4	70	12	4	9.5	4.5	1	.6	.1
12	.....	.4	26	11	4	10	4	1	.5	.1
13	.....	.4	18	10	6	12	3.5	1	.5	.1
14	.....	.4	18	10	7.5	13	3.5	.9	.5	.1
15	.....	.4	18	9	6	13	3.5	.9	.5	.1
16	.....	.4	11	9	5	12	3.5	.9	.5	.1
17	0.1	.4	10	9	4	12	3	.9	.5	.1
18	.5	.4	10	8	4	11	3	.9	.4	.1
19	1.0	.4	9	8	4	11	3	.9	.4	.1
20	.9	.4	9	8	4	10	3	.8	.4	.1
21	.9	.4	9	7	5	10	2.5	.8	.4	.1
22	.8	1	8.5	6	5.5	9	2.5	.8	.4	.1
23	.8	1	8.5	6	6.5	9	2.5	.8	.4	.1
24	.7	4	8.5	6	6.5	9	2.5	.8	.4	.1
25	.6	3	24	5.5	6.5	9	2.5	.7	.3	.1
26	.4	2	11	5.5	6.5	8	2.5	.7	.3	.1
27	.4	1.5	9	6	6	7.5	2.5	.7	.3	.1
28	.4	5	8	6	6	7.5	2.5	.7	.3	.1
29	.4	50	.....	6.5	6.5	7	2.5	.7	.3	.1
30	.4	30	.....	6.5	15	7	2.5	.6	.3	.1
31	.4	8	.....	6.5	.....	6.5	.....	.5	.3	.....

NOTE.—Discharge determined from rating curves defined as follows: Dec. 17 to Feb. 2, poorly defined; Feb. 3 to Mar. 28 and May 6 to June 24, fairly well defined; Mar. 29 to May 5, poorly defined. No flow Oct. 1 to Dec. 16. See "Accuracy" in the station description.

Monthly discharge of Susanna Creek near Warner Springs, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	0.0	0.0	0.0	0	
November	.0	.0	.0	0	
December	1	.0	.28	17	D.
January	50	.4	3.67	226	D.
February	70	5	15.4	855	D.
March	13	5.5	8.85	544	D.
April	15	4	5.55	330	D.
May	30	6.5	12.3	756	D.
June	6.5	2.5	3.93	234	D.
July	2	.5	1.05	65	
August	.7	.3	.46	28	
September	.2	.1	.12	7	
The year	70	.0	4.23	3,060	

Digitized by Google

MATAGUAL CREEK NEAR WARNER SPRINGS, CAL.

LOCATION.—In the SE. ¼ sec. 28, T. 11 S., R. 3 E., San Diego County, in Valle de San Jose grant, near mouth of canyon, and about 5 miles southwest of Warner Springs.

DRAINAGE AREA.—9.2 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 16, 1912, to September 30, 1915, when station was discontinued (discharge measurements only for year 1912–13).

GAGE.—Depth of water over a reference hub in pool above control is measured about once a week by hydrographer of Volcan Land & Water Co.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Channel composed of shifting sand. A timber control has been constructed just below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year not known; maximum mean daily discharge for year, estimated as 75 second-feet February 11; minimum stage recorded, 0.15 foot October 20 (discharge, 0.2 second-foot).

1912–1915: Maximum stage not known; record incomplete; maximum mean daily discharge, 125 second-feet (estimated) February 21, 1914; minimum discharge, 0.2 second-foot (estimated) September, 1914.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Gage read only once a week; discharge for days on which gage was not read interpolated between measurements or estimated by comparison with records on West Fork of San Luis Rey River and Carrizo Creek near Warner Springs. Results poor.

Discharge measurements of Matagual Creek near Warner Springs, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 16	W. J. Isbell	0.18	0.3	Apr. 17	W. J. Isbell	0.58	3.8
Nov. 28	do	.20	.5	May 8	do	.98	20
Dec. 14	do	.23	.8	14	R. W. Day	.85	10
21	do	.26	.9	June 28	W. J. Isbell	.56	3.4
Jan. 8	do	.23	.7	July 10	do	.39	1.8
18	do	.24	.6	16	do	.34	1.3
Feb. 4	do	.83	10	27	do	.37	1.7
13	do	.93	16	Aug. 9	do	.36	1.5
19	do	.79	8.7	14	do	.35	1.3
Mar. 3	do	.83	11	19	do	.29	.7
13	do	.80	11	27	do	.36	1.3
26	do	.64	5.8	Sept. 11	do	.32	.7
Apr. 3	do	.63	4.5	29	do	.34	.9

Digitized by Google

Daily discharge, in second-feet, of Matagual Creek near Warner Springs, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July.	Aug.	Sept.
1	0.3	0.8	0.6	0.7	10	20	5	15	8	3	1.5	1
2	.3	.8	a.6	.7	30	15	4	10	8	3	1.5	1
3	.3	.6	.6	.7	20	a11	a4.5	a12	a8	3	1.5	1
4	a.3	.6	.6	.7	a10	11	4	15	8	3	1.5	.9
5	.3	.5	.6	a.7	5	11	4	25	7.5	2.5	1.5	.9
6	.3	.4	.5	.7	5	11	4	20	7.5	2.5	1.5	.9
7	.3	a.3	.5	.7	4	11	4	20	7	2.5	1.5	.8
8	.3	.3	a.5	a.7	4	11	a4	a20	7	2	1.5	.8
9	.3	.3	1.0	.7	a4	11	4	15	6.5	2	a1.5	.8
10	.3	.3	1.5	a.7	60	a11	4	15	a6.5	a2	1.5	.7
11	.3	.4	1.0	.7	75	11	4	15	6	2	1.5	a.7
12	.3	.4	.8	.7	30	11	4	12	5	2	1.5	.7
13	.3	.4	.8	.7	a16	a11	4	11	4.5	1.5	1.5	.7
14	a.3	a.4	a.8	.6	14	10	4	a10	a4	1.5	a1.5	.7
15	.3	.4	.8	.6	a12	9	4	10	4	1.5	1.5	.7
16	a.3	a.4	.8	.6	11	9	4	10	4	a1.5	1	.8
17	.3	.4	.8	.6	10	8	a4	10	4	1.5	.9	.8
18	.2	.4	.9	a.6	9	8	4	10	4	1.5	.8	.8
19	.2	.4	.9	.6	a8.5	7	4	10	4	1.5	a.7	.8
20	a.2	.4	.9	.6	9	7	4	9	4	1.5	.7	.8
21	.2	.4	a.9	1	9.5	6	5	9	4	1.5	.8	.8
22	.8	.5	.9	2	a10	6	5	9	3.5	1.5	.9	.8
23	a.3	.5	.9	2	10	6	5	9	3.5	1.5	1	.8
24	.3	.5	.9	2	10	6	5	9	3.5	1.5	1	.8
25	.3	.5	.5	3	10	6	5	9	3.5	1.5	1	.9
26	.3	.5	.4	a.8	10	a6	5	9	3.5	1.5	1.5	.9
27	.5	.5	.5	.6	a10	6	5	9	3.5	a1.5	a1.5	.9
28	.7	a.5	.8	7	8	6	5	9	a3.5	1.5	1.5	.9
29	.8	.5	a.8	55	.....	5	5	9	a3.5	1.5	1.5	a.9
30	.8	.5	.6	35	.....	5	10	8	3.5	1.5	1.5	.9
31	.8	.....	.4	10	.....	a5	.....	8	.....	1.5	1.5	.....

a Gage read on this day.

Monthly discharge of Matagual Creek near Warner Springs, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	0.8	0.2	0.37	23	
November	.8	.3	.46	27	
December	1.5	.4	.75	46	
January	55	.6	4.25	261	D.
February	75	4	15.1	839	D.
March	20	5	8.94	550	D.
April	10	4	4.55	271	D.
May	25	8	12.0	738	D.
June	8	3.5	5.10	304	D.
July	3	1.5	1.87	115	D.
August	1.5	.7	1.30	80	D.
September	1.0	.7	.83	49	
The year	75	.2	4.56	3,300	

Digitized by Google

ESCONDIDO MUTUAL WATER CO.'S CANAL NEAR NELLIE, CAL.

LOCATION.—In the SW. ¼ NW. ¼ sec. 33, T. 10 S., R. 1 E., 500 feet below intake on left bank of San Luis Rey River, about 3½ miles above Rincon Indian Reservation, 4 miles southwest of Nellie, San Diego County, and 15 miles northeast of Escondido.

RECORDS AVAILABLE.—October 1, 1896, to September 30, 1915, except that there are no records for the years ending September 30, 1902 and 1904.

DISCHARGE.—November, 1896, to August, 1909, a weir in the wooden flume, about 200 feet below the sand box at the intake, was used. The weir consisted of a 1-inch board, held in position by guides fastened to the sides of the flume. Different widths of boards, ranging from 6 to 12 inches, were used during this period. The head on the weir was read by holding a foot-rule on the crest. January 1, 1910, to August 1, 1914, except December 1, 1912, to May 4, 1913, the weir was at the lower end of the sand box. The crest length was 6 feet and there was one partial end contraction. The head was measured from the top of a stake set level with the crest and 2 feet upstream. December 1, 1912, to May 4, 1913, observations were made over a 4 by 6 inch timber laid on its 4-inch face in a straight section of the concrete canal opposite the zanjero's house at the tunnel camp about two miles below the intake. The length of the weir was 65 inches and the head was measured from the top of a stake set level with the crest and 4 feet upstream. Recently Mr. E. R. Bowen developed rating curves for the various crude weirs which have been in use and recomputed past records. The following tables of daily and monthly discharge supersede those published in previous water-supply papers.

COOPERATION.—Record, as published, was furnished by J. B. Lippincott.

The canal, which is 5.6 miles long, consists of flume, ditch, and tunnel sections constructed through a very rough, mountainous country. It discharges into a reservoir about 6 miles northeast of Escondido. The dam, which is 76 feet high and 380 feet long, is of the usual rock-fill type with a facing of redwood planks. The reservoir (capacity 3,120 acre-feet) supplies water for irrigation and domestic use at Escondido and vicinity.

Discharge measurements of Escondido Mutual Water Co.'s canal near Nellie, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.[a]	Discharge.	Date.	Made by—	Gage height.[a]	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 11	W. J. Isbell	0.56	8.9	July 29	W. J. Isbell	0.52	9.1
25	do	.91	21	Aug. 7	do	.40	5.7
July 2	do	.89	20	7	do	.36	4.6
9	do	.84	18.0	7	do	.30	3.5
12	F. C. Ebert	.63	10.6	7	do	.14	1.0
24	W. J. Isbell	.53	9.6				

[a] Head on weir.

Digitized by Google

Daily discharge, in second-feet, of Escondido Mutual Water Co.'s canal near Nellie, Cal., for the years ending Sept. 30, 1897–1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June.	July	Aug.	Sept.
1896–97.												
1	1.2	4.25	6.2	a8.6	a31.2	b31.2	.....	8.6	.....	.....	.....	.....
2	1.2	3.6	6.2	8.6	a35.0	a40.8	.....	8.6	.....	.....	.....	.....
3	.85	3.1	5.5	7.7	a35.5	a37.2	.....	8.6	.....	.....	.....	.....
4	.85	3.1	5.5	a7.7	a35.0	a35.0	.....	8.6	.....	.....	.....	.....
5	.85	3.1	5.5	6.95	a33.1	a40.8	.....	6.95	.....	.....	.....	.....
6	.85	3.6	5.5	6.95	a36.0	a38.0	35.0	6.95	.....	.....	.....	.....
7	.85	3.6	5.5	6.2	a37.0	b35.0	a29.2	5.5	.....	.....	.....	.....
8	.85	3.6	5.5	6.2	c31.2	.....	a31.2	5.5	.....	.....	.....	.....
9	1.05	3.6	4.9	6.2	a33.1	c31.2	a31.2	4.25	.....	.....	.....	.....
10	1.05	4.9	4.9	a9.1	a26.3	a33.1	a33.1	4.25	.....	.....	.....	.....
11	1.2	6.2	5.5	a19.5	a23.4	a33.1	a29.2	4.25	.....	.....	.....	.....
12	1.2	5.2	5.5	a19.5	a23.4	a37.0	a33.1	4.25	.....	.....	.....	.....
13	1.2	4.25	6.2	23.4	a23.4	a38.9	a37.0	4.25	.....	.....	.....	.....
14	1.65	3.6	5.5	.....	a23.4	a37.0	a35.0	3.1	.....	.....	.....	.....
15	1.65	3.1	5.5	.....	a22.0	a37.0	a31.2	3.1	.....	.....	.....	.....
16	1.4	3.6	15.6	.....	a20.4	a35.0	a33.2	3.1	.....	.....	.....	.....
17	1.65	3.1	10.2	13.8	a21.9	a31.2	a27.2	3.1	.....	.....	.....	.....
18	1.85	3.1	9.4	21.4	b31.2	a29.2	a27.2	3.1	.....	.....	.....	.....
19	1.65	3.1	8.6	a25.4	.....	a24.4	a25.4	3.1	.....	.....	.....	.....
20	2.05	3.1	6.95	a25.4	.....	a15.6	a25.4	3.1	.....	.....	.....	.....
21	2.8	3.1	5.5	a26.8	.....	a15.6	a19.5	2.05	.....	.....	.....	.....
22	3.1	3.1	5.5	a24.1	.....	a15.6	a15.6	.....	.....	.....	.....	.....
23	3.1	3.1	5.5	a22.5	.....	a15.6	12.0	.....	.....	.....	.....	.....
24	2.55	4.25	5.5	a22.5	a31.2	a15.6	12.0	.....	.....	.....	.....	.....
25	2.55	19.4	4.25	a22.5	a35.0	a15.6	12.0	.....	.....	.....	.....	.....
26	2.55	.....	4.25	a22.5	a35.0	a15.6	12.0	.....	.....	.....	.....	.....
27	8.6	8.6	4.25	a23.0	a35.0	a 5.5	12.0	.....	.....	.....	.....	.....
28	12.0	7.7	a10.6	a22.0	a33.1	a 5.5	12.0	.....	.....	.....	.....	.....
29	9.4	7.7	a21.4	a27.3	.....	a 5.5	12.0	.....	.....	.....	.....	.....
30	4.25	6.2	a11.1	a32.2	.....	a 5.5	12.0	.....	.....	.....	.....	.....
31	4.25	.....	a 9.0	a35.0	.....	.....	.....	.....	.....	.....	.....	.....
1897–98.												
1	.....	.....	.....	6.2	a18.5	a10.2	a13.8	.....	.....	.....	.....	.....
2	.....	.....	4.25	5.5	a18.5	a10.2	a13.1	.....	.....	.....	.....	.....
3	.....	.....	4.25	10.2	a18.5	a10.2	a12.2	.....	.....	.....	.....	.....
4	.....	.....	4.25	10.2	a17.5	a10.0	a11.8	.....	.....	.....	.....	.....
5	.....	.....	4.25	6.95	a17.5	a 9.8	a11.1	.....	.....	.....	.....	.....
6	.....	.....	3.6	9.4	a16.1	a 9.4	a10.4	.....	.....	.....	.....	.....
7	.....	.....	3.6	9.4	a17.5	a 9.8	a10.2	.....	.....	.....	.....	.....
8	.....	.....	3.6	a35.6	a37.0	a10.2	a10.2	.....	.....	.....	.....	.....
9	.....	.....	3.1	.....	a25.3	a 9.8	a10.2	.....	.....	.....	.....	.....
10	.....	.....	3.1	12.0	a21.4	a29.2	a10.2	.....	.....	.....	.....	.....
11	.....	.....	3.1	b12.0	a20.0	a35.0	a10.2	.....	.....	.....	.....	.....
12	.....	.....	3.1	.....	a16.6	a23.4	a10.2	.....	.....	.....	.....	.....
13	.....	.....	3.1	8.6	a14.2	a19.2	8.1	.....	.....	.....	.....	.....
14	.....	.....	3.1	a20.4	a12.7	a21.4	7.7	.....	.....	.....	.....	.....
15	.....	.....	.....	a21.4	a12.0	a25.8	7.7	.....	.....	.....	.....	.....
16	.....	.....	8.6	a20.8	a12.0	a20.0	a 8.15	.....	.....	.....	.....	.....
17	.....	.....	6.95	a28.3	a15.2	a23.9	11.6	.....	.....	.....	.....	.....
18	.....	.....	12.0	a29.2	a25.3	a23.8	.....	.....	.....	.....	.....	.....
19	.....	.....	.....	a21.4	a18.5	a29.2	.....	.....	.....	.....	.....	.....
20	.....	.....	12.0	a20.4	a15.2	a31.2	.....	.....	.....	.....	.....	.....
21	.....	.....	12.0	a16.2	a14.0	a23.4	.....	.....	.....	.....	.....	.....
22	.....	.....	12.0	a14.7	a12.4	a19.0	.....	.....	.....	.....	.....	.....
23	.....	.....	12.0	a30.2	a11.6	a21.0	.....	.....	.....	.....	.....	.....
24	.....	.....	12.0	a34.0	a11.1	a17.3	.....	.....	.....	.....	.....	.....
25	.....	.....	10.2	a27.3	a11.1	a15.6	.....	.....	.....	.....	.....	.....
26	.....	.....	10.2	a21.4	a11.1	a30.2	.....	.....	.....	.....	.....	.....
27	.....	.....	10.2	a15.7	a11.1	a26.3	.....	.....	.....	.....	.....	.....
28	.....	.....	8.6	a21.4	a10.4	a24.1	.....	.....	.....	.....	.....	.....
29	.....	.....	8.6	a24.4	.....	a20.7	.....	.....	.....	.....	.....	.....
30	.....	.....	8.6	a21.4	.....	a17.0	.....	.....	.....	.....	.....	.....
31	.....	.....	6.95	a17.5	.....	a15.2	.....	.....	.....	.....	.....	.....

a Mean of a. m. and p. m. readings. b No flow in p. m. c No flow in a. m.

NOTE.—Gage was read once each day unless otherwise indicated. Canal was dry on days for which no discharge is given. These tables supersede those previously published in water-supply papers.

Digitized by Google

Daily discharge, in second-feet, of Escondido Mutual Water Co.'s canal near Nellie, Cal., for the years ending Sept. 30, 1897–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1898–99.												
1					3.6	6.6	12.9					
2					21.4	6.2	11.1					
3					35.0	5.85	10.6					
4					15.6	5.5	10.2					
5					17.5	4.9	9.8					
6					12.0	4.25	9.4					
7					12.0	4.25	8.6					
8					12.0	4.25	7.7					
9					11.1	4.25	7.3					
10					10.6	4.25	6.95					
11					10.2	4.25	6.6					
12					9.4	4.25	6.2					
13					9.4	4.25	5.5					
14					9.4	4.25	5.2					
15					9.4	4.25	4.9					
16				6.95	8.6	4.25	4.55					
17				6.95	8.1	a33.1	4.25					
18				6.95	6.95	a29.2						
19				6.6	6.6	a17.6						
20				6.2	6.2	a26.4						
21				5.85	5.85	a33.1						
22				5.5	5.5	a23.4						
23				3.6	5.5	a16.6						
24				4.25	19.4	13.8						
25				4.25	12.0	12.9						
26				4.25	8.6	22.5	5.5					
27				3.95	7.7	13.8	4.9					
28				3.6	6.95	12.9						
29				3.6								
30				3.6		16.6						
31				3.6		13.8						
1899–1900.												
1				5.2	6.95	3.95	4.25	7.3				
2				4.9	6.95	4.25	4.25	6.95				
3				a8.75	6.95	4.25	5.5	6.2				
4				6.95	6.95	a6.42	5.5	10.2				
5				a19.5	7.3	12.0	5.5	a19.6				
6				a13.1	7.3	7.7	5.2	a29.2				
7				a11.6	6.95	6.95	5.5	15.6				
8				10.2	6.95	6.2	6.95	12.0				
9				9.8	6.95	5.5	6.95	8.6				
10				9.4	6.95	5.5	6.2	6.95				
11				8.1	6.95	5.2	5.5	12.9				
12				7.7	6.95	4.55	4.9	15.6				
13				7.7	6.95	4.55	4.55	10.2				
14				7.7	6.95	4.55	4.9	8.6				
15				7.7	6.95	a12.1	4.25	6.95				
16				7.7	6.6	4.55	3.95	4.9				
17				6.95	6.6	4.55	3.6					
18				6.95	6.2	4.25	3.35					
19				6.95	6.95	4.55	3.1					
20				6.95	6.6	4.55	3.1					
21				6.95	6.6	4.55	12.0					
22				6.95	6.2	4.9	25.4					
23				6.95	5.5	a10.3	13.8					
24				6.95	4.55	10.2	10.2					
25				6.95	4.55	5.5	7.3					
26				7.3	4.25	5.2	6.95					
27				7.3	3.95	4.9	7.7					
28				7.3	3.6	4.55	a17.7					
29				6.95		4.55	a13.4					
30				6.95		4.25	9.4					
31				6.95		4.25						

a Mean of a. m. and p. m. readings.

Digitized by Google

Daily discharge, in second-feet, of Escondido Mutual Water Co.'s canal near Nellie, Cal., for the years ending Sept. 30, 1897–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1900–1.												
1	.....	.....	3.6	.....	a21.4	.....	19.4	.....	.....	.....	.....	.....
2	.....	.....	3.6	.....	a27.3	.....	18.4	.....	.....	.....	.....	.....
3	.....	.....	3.35	.....	a27.3	.....	17.5	.....	.....	.....	.....	.....
4	.....	.....	3.35	.....	31.2	.....	21.4	.....	.....	.....	.....	.....
5	.....	.....	3.35	3.1	33.1	.....	19.4	.....	.....	.....	.....	.....
6	.....	.....	3.35	12.0	.....	.....	18.4	.....	.....	.....	.....	.....
7	.....	.....	3.35	25.4	.....	.....	20.5	.....	.....	.....	.....	.....
8	.....	.....	3.1	.....	.....	.....	17.5	.....	.....	.....	.....	.....
9	.....	.....	3.1	15.6	.....	11.1	16.6	.....	.....	.....	.....	.....
10	.....	.....	3.1	12.0	.....	17.5	15.6	.....	.....	.....	.....	.....
11	.....	.....	.....	10.2	.....	23.4	14.7	.....	.....	.....	.....	.....
12	.....	.....	.....	8.6	12.0	25.4	.....	.....	.....	.....	.....	.....
13	.....	.....	.....	6.95	23.4	23.4	.....	.....	.....	.....	.....	.....
14	.....	.....	.....	6.2	31.2	21.4	.....	.....	.....	.....	.....	.....
15	.....	.....	.....	5.5	33.1	19.4	.....	.....	.....	.....	.....	.....
16	.....	1.85	.....b	5.5	33.1	19.4	.....	.....	.....	.....	.....	.....
17	.....	10.2	.....	5.5	.....	19.4	.....	.....	.....	.....	.....	.....
18	.....	15.6	.....	5.5	.....	18.4	.....	.....	.....	.....	.....	.....
19	.....	15.6	.....	5.5	.....	17.5	.....	.....	.....	.....	.....	.....
20	.....	12.0	.....	8.6	.....	17.5	.....	.....	.....	.....	.....	.....
21	.....	10.2	.....	a20.4	.....	19.4	.....	.....	.....	.....	.....	.....
22	.....	21.4	.....	a17.5	.....	19.4	.....	.....	.....	.....	.....	.....
23	.....	21.4	.....	14.7	.....	18.4	.....	.....	.....	.....	.....	.....
24	.....	10.2	.....	12.9	.....	17.5	.....	.....	.....	.....	.....	.....
25	.....	6.95	.....	23.4	.....	16.6	.....	.....	.....	.....	.....	.....
26	.....	5.5	.....	25.4	.....	16.1	.....	.....	.....	.....	.....	.....
27	.....	5.2	.....	17.5	.....	15.6	.....	.....	.....	.....	.....	.....
28	.....	3.6	.....	17.5	.....	14.7	.....	.....	.....	.....	.....	.....
29	.....	3.6	.....	15.6	.....	13.8	.....	.....	.....	.....	.....	.....
30	.....	4.25	.....	12.0	.....	20.5	.....	.....	.....	.....	.....	.....
31	.....	.....	.....	10.6	.....	20.5	.....	.....	.....	.....	.....	.....
1902–3.												
1	.....	.....	.....	5.5	a10.6	a16.1	a15.6	a27.2	.....	.....	.....	.....
2	.....	.....	.....	5.5	a15.6	a13.6	.....	a10.2	.....	.....	.....	.....
3	.....	.....	.....	5.5	a27.2	a13 8	b15.6	a10.2	.....	.....	.....	.....
4	.....	.....	.....	5.5	a 5.5	a14.7	a27.2	a10.2	.....	.....	.....	.....
5	.....	.....	2.0	5.5	a27.2	a18.5	a27.2	a10.2	.....	.....	.....	.....
6	.....	.....	.....	5.5	a27.2	a27.2	a27.2	a12.0	.....	.....	.....	.....
7	.....	.....	2.0	5.5	a25.3	a27.2	a27.2	a12.0	.....	.....	.....	.....
8	.....	.....	.....	5.5	a26.3	a27.2	a27.2	a12.0	.....	.....	.....	.....
9	.....	.....	.....	5.5	a27.2	a27.2	a27.2	12.0	.....	.....	.....	.....
10	.....	.....	.....	3.6	a27.2	a26.8	a27.2	.....	.....	.....	.....	.....
11	.....	.....	4.5	3.6	a27.2	a26.3	a27.2	.....	.....	.....	.....	.....
12	.....	.....	.....	3.6	a27.2	a24.8	a27.2	.....	.....	.....	.....	.....
13	.....	.....	9.0	3.6	a26 3	a23.8	a27.2	.....	.....	.....	.....	.....
14	.....	.....	.....	3.6	a21.4	a22.2	a27.2	.....	.....	.....	.....	.....
15	.....	.....	.....	3.6	a24.4	a20.5	5.5	.....	.....	.....	.....	.....
16	.....	.....	.....	3.6	a23.4	a20.0	5 5	.....	.....	.....	.....	.....
17	.....	.....	.....	3.6	a23 4	a25.3	.....	.....	.....	.....	.....	.....
18	.....	.....	.....	3.6	a23.4	a21.4	.....	.....	.....	.....	.....	.....
19	.....	4.0	.....	3.6	a23 9	a18.0	.....	.....	.....	.....	.....	.....
20	.....	.....	.....	3.6	a23.9	a16.1	.....	.....	.....	.....	.....	.....
21	.....	6.5	.....	3.6	a23.9	a16.1	.....	.....	.....	.....	.....	.....
22	.....	.....	.....	3.6	a23.9	a15.2	.....	.....	.....	.....	.....	.....
23	.....	.....	.....	3.6	a22.4	a14.2	.....	.....	.....	.....	.....	.....
24	.....	.....	.....	3.6	a24.4	a21.4	a15.6	.....	.....	.....	.....	.....
25	.....	.....	.....	a 4.9	a23.9	a27.2	a27.2	.....	.....	.....	.....	.....
26	.....	.....	.....	a 6.6	a21.9	a27.2	a27.2	.....	.....	.....	.....	.....
27	.....	.....	.....	a 5.85	a19.5	a23.9	a27.2	.....	.....	.....	.....	.....
28	.....	.....	.....	a11.6	a17.0	a20.0	a27.2	.....	.....	.....	.....	.....
29	.....	2.5	.....	a21.4	.....	a18.0	a27.2	.....	.....	.....	.....	.....
30	.....	.....	.....	a10.7	.....	a19.0	a25.3	.....	.....	.....	.....	.....
31	.....	.....	.....	a12.9	.....	a27.2	.....	.....	.....	.....	.....	.....

a Mean of a. m. and p. m. readings. b No flow in a. m.

Digitized by Google

Daily discharge, in second-feet, of Escondido Mutual Water Co.'s canal near Nellie, Cal., for the years ending Sept. 30, 1897–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1904–5.												
1						a27.8	a27.2	a27.2				
2						a25.8	a27.2					
3						a27.2	a27.2					
4						a28.2	a27.2	a15.6				
5						a27.2	a27.2	a26.3				
6						a26.8	a2.72	a27.2				
7						a27.2	a27.2	a27.2				
8						a26.8	a27.2	a25.8				
9						a25.8	a27.2	a27.2				
10						a23.0	a27.2	a27.2				
11						a22.4	a27.2	a27.2				
12						a26.3	a27.2	a27.2				
13						a24.8	a27.2	a27.2				
14						a26.3	a27.2	a27.2				
15						a24.4	a27.2	a27.2				
16							a27.2					
17							a27.2					
18							a27.2					
19							a27.8					
20							a27.2					
21							a27.2					
22							a27.2					
23							a27.2					
24						15.6	a27.2					
25						a22.5	a27.2					
26						a22.5	a27.2					
27						a22.5	a27.2					
28						a26.3	a27.2					
29						a27.2	a27.2					
30						a27.8	a27.2					
31						a27.2						
1905–6.												
1					a12.4	a27.2						
2					a12.6	a26.8						
3					a10.2	a24.8						
4					a10.2							
5					a11.1							
6					a12.0							
7					a24.4	a11.1						
8					a23.4	a10.2						
9					a26.3	a10.2						
10					a19.4	a15.6						
11					a23.4	a15.6						
12					a27.2							
13					a27.2							
14					a24.4							
15												
16					a27.2							
17				a8.6	a27.2							
18				a8.6	a27.2							
19					a27.2							
20				a15.6	a27.2							
21				a21.4	a27.2							
22				a25.4	a27.2							
23				a24.4	a27.2							
24				a19.5	a25.8							
25				a17.0	a24.6							
26				a15.6	a23.4							
27				a15.2	a21.0							
28				a14.7	a25.8							
29				a13.8								
30				a13.4								
31				a12.9								

a Mean of a. m. and p. m. readings.

Digitized by Google

Daily discharge, in second-feet, of Escondido Mutual Water Co.'s canal near Nellie, Cal., for the years ending Sept. 30, 1897–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1906–7.												
1			a13.4						10.2	5.5		
2			a14.2	a24.3					10.2	5.5		
3			a14.7	a24.3					10.2	5.5		
4			a15.2						8.6	5.5		
5			a16.6	a17.7					8.6	5.5		
6	3.1		a14.7	b21.4					8.6	5.5		
7	3.6		a14.2						8.6			
8	3.1		a13.4						8.6			
9	3.6		a14.7						10.2			
10	7.7		a14.7						10.2			
11	3.1		a15.6						10.2			
12	3.6		a18.5					4.25	8.6			
13	3.6		a20.4					4.25	8.6			
14	3.1							4.25	8.6			
15	3.1		25.4					4.25	8.6			
16	3.6		a24.3					5.5	8.6			
17	3.1		a24.3					5.5	8.6			
18	3.1		a24.3					5.5	8.6			
19	3.1		a22.4					6.95	8.6			
20	3.6		a20.4					6.95	8.6			
21	3.1		a19.0					6.95	7.7			
22	3.6		a16.6					6.95	7.7			
23	3.6		a16.6					6.95	7.7			
24			a16.6					7.7	7.7			
25			a16.6					7.7	7.7			
26			b17.5					8.6	6.95			
27			a19.4					8.6	6.95			
28		a9.0	a19.4					9.4	6.95			
29		a9.0	a24.3					9.4	6.95			
30		a14.2	a24.3					10.2	6.2			
31			19.4					10.2				
1907–8.												
1			8.6	a12.9	a12.0	a5.5	a12.0	a11.6	a7.7			
2			8.1	a12.4	a12.0	a5.5	a12.0	a12.0	a7.7			
3			8.1	a12.0		a5.5	a12.0	a12.0	a7.7			
4			8.1	a12.0			a12.0	a12.0	a7.7			
5			8.6	a11.8	a5.5		a12.0	a12.0				
6			8.6	a11.3	a5.5		a12.0	a12.0				
7			9.4	a10.6	a5.5	a5.5	a12.0	a12.0				
8			9.4	a10.2	a5.5	a5.5	a12.0	a11.1				
9			4.25	a10.2		a5.5	a12.0	a11.1				
10			8.6	a10.2		a5.5	a12.0	a11.1				
11			9.4	a10.0	a5.5	a5.5	a12.0	a11 1				
12			9.4	a9.8	a5.5	a5.5	a12.0	a11.1				
13			9.4	a10.2	a5.5	a5.5	a12 0	a10.2				
14			9.4	a10.2	a5.5	a5.5	a12.0	a10.2				
15			10.2	a14.7	a5.5	a5.5	a12.0	a10.2				
16			9.4	a14.7	a5.5	a5.5	a12.0	a11 1				
17			9.8	a14.7	a5.5	a5.5	a12.0	a10.2				
18			9.4	a14.2	a5.5	a5.5	a12.0	a10.2				
19			10.2	a13.8	a5.5	a5.5	a12.0	a10.2				
20			10.2	a13.8	a5.5	a9.8	a12.0	a8.6				
21			10.2	a13.4	a5.5	a9.8	a12.0	a8.6				
22			a10.2	a12.9	a5.5	a9.8	a12.0	a8.6				
23			a10.2	b12.9	a5.5	a9.8	a12.0	a8.6				
24			a10.2		a5.5	a10.2	a12.0	a8.6				
25			a10.2		a5.5	a12.0	a12.0	a8.6				
26		9.0	a10.2		a5.5	a8.6	a12.0	a8.6				
27		9.0	a10.2		a5.5	a12.0	a12.0	a8.6				
28		9.0	a10.2		a5.5	a12.0	a12.0	a8.6				
29		8.6	a10.2	a12.0	a5.5	a12.0	a12.0	a8.6				
30		8.6	a13.4	a12.0		a12.0	a12.0	a8.6				
31			a12.9	a12.0		a12.0		a7.7				

a Mean of a. m. and p. m. readings. b No flow in p. m.

Digitized by Google

Daily discharge, in second-feet, of Escondido Mutual Water Co.'s canal near Nellie, Cal., for the years ending Sept. 30, 1897–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1908–9.												
1			6.2	6.2	23.4	19.4	17.5	10.2	10.2	2.55		
2			6.2	5.5	23.4	19.4	18.4	10.2	10.2	2.05		
3			6.95	6.2	23.4	19.4	18.4	10.2	10.2	2.05		
4			6.95	6.2		19.4	a16.6	10.2	8.6	2.55		
5			6.95	6.2	23.4	21.4	a18.4	10.2	7.7	2.55		
6			6.95	6.2	15.6	21.4	a19.0	10.2	6.95	2.55		
7			8.6	6.2	15.6	21.4	a18.4	10.2	6.95	2.05		
8			6.95	6.2		21.4	a19.4	10.2	6.95	2.05		
9			6.95	10.2	21.4	23.4	a19.0	10.2	6.2	2.05		
10			6.2	8.6	21.4	23.4	a19.0	10.2	6.2	2.05		
11			6.2	8.6		13.8	a18.4	10.2	6.2	2.05		
12			6.2	11.1		23.4	a18.4	10.2	6.2	2.05		
13			6.2	11.1		23.4	a18.4	10.2	6.2	2.05		
14			6.2	11.1		21.4	a10.2	10.2	6.2	2.05		
15			6.2	16.6		21.4	a10.2	10.2	6.2	2.05		
16			10.2	19.4		23.4	a10.2	10.2	6.2	2.05		
17			8.6	12.0		21.4	a10.2	10.2	6.2	2.05		
18			8.6	12.9			a10.2	10.2	6.2	2.05		
19			6.95	12.9			a10.2	10.2	6.2	2.05		
20			6.2	12.9			a10.2	10 2	5.85	2.05		
21			6.2	12.9			a10.2	10.2	5.85	2.05		
22			6.2				a10.2	10.2	5.5	2.05		
23			6.2				a10.2	10.2	4.9	2.05		
24		6.95	6.2			a11.2	a10.2	10.2	4.25	2.05		
25		6.95	6.2			14.7		10.2	4.25			
26			6.2		8.6	14.7	10.2	10.2	3.6			
27		6.2	6.2		12.0		10.2	10.2	3.6			
28		6.2	6.2	14.2	12.0		10.2	10.2	3.1			
29		6.2	6.2	19.4			10.2	10.2	3.1			
30		6.2	6.2	15.6		14.7	10.2	10.2	3.1			
31			6.2	15.6		15.6		10.2				
1909–10.												
1					11.7	17.3	6.4	7.5		1.2	1.2	
2					11.7	17.3	6.4	7 5	3.0	1.2	.8	
3					11.7	17.3	6.4	7.5	3.0	1.2	.8	
4					11.7		6.4	7.5	3.0	.8	.8	
5					11.7		6.4	7.5	3.0	.8	.8	
6					11.7		6.4	7.5	2.3	.8	.8	
7					11.7	17.3	6.4	7.5	2.3	.8	.8	
8				6.4	11.7	17.3	6.4	7.5	1.7	.8	1.2	
9				6.4	12.3	14.4	6.4	7.5	1.7	.8	1.2	
10				7.5	12.3	14.4	6.4	7.5	1.7	.8	1.2	
11				7.5	12.3	17.3	6.4	7.5	1.7	.8	1.2	
12				12.3	12.3	17.3	6.4	7.5	1.2	.8		
13				13.0	12.3	17.3	6.4	7.5	1.2	.8		
14				13.0	13.7	17.3	6.4	7.5	1.2	.8		
15				11.7	13.7	17.3	6.4	7.5	1.7	1.2		
16					15.8	17.3	6.4	7.5	2.3	1.2		
17				11.7	15.1	17.3	6.4	7.5	2.3	1.2		
18				11.7	16.5	17.3	6.4	7.5	2.3			
19				11.7	16.5	17.3	6.4	7.5	1.7			
20				11.7	17.3	17.3	6.4	7.5	1.7			
21				11.7	17.3	17.3	6.4	7.5	1.7			
22				11.7	17.3	17.3	6.4	5.4	1.7			
23				11.7	17.3	6.4	6.4	5.4	1.7			
24				11.7	17.3	6.4	6.4	5.4	1.7			
25				11.7	17.3	6.4	6.4	5.4	1.2			
26				11.7	17.3	6.4	7.5	5.4	1.2			
27				11.7	17.3	6.4	7.5	5.4	1.2			
28				11.7	17.3	6.4	7.5	4.6	1.2			
29				11.7		6.4	7.5	4.6	1.2			
30				11.7		6.4	7.5		1.2			
31				11.7		6.4						

a Mean of a. m. and p. m. readings.

Digitized by Google

Daily discharge, in second-feet, of Escondido Mutual Water Co.'s canal near Nellie Cal., for the years ending Sept. 30, 1897–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1910-11.												
1			2.3	3.7			20.3	16.5				
2			2.3	3.7		20.3	20.3	15.1				
3			2.3	3.7		20.3	20.3	13.7				
4			2.3	3.7		19.5	20.3	13.7				
5			2.3	3.7		20.3	20.3	13.7				
6			2.3	3.7			20.3	13.7				
7			2.3	3.0		17.3	20.3	12.3				
8			2.3	3.0		20.3	20.3	11.0				
9			2.3			20.3	20.3	11.0				
10			2.3			20.3	20.3	9.8				
11			2.3			20.3	20.3	9.8				
12			2.3			20.3	20.3	8.6				
13			2.3			20.3	20 3	7.5				
14			2.6	12.3		20.3	20.3	8.6				
15			2.6		17.3	20.3	20.3	9.8				
16			2.6	12.3	19.5	20.3	20.3	8.6				
17			2.3	15.1	19.5	20.3	20.3	8.6				
18			2.3	17.3	19.5	20.3	20.3	8.6				
19			2.3	15.1	19.5	20.3	20.3	7.5				
20			3.0	13.7	19.5	20.3	20.3	7.5				
21			3.0	12.3	19.5	20.3	20.3	6.4				
22			3.7	11.0	19.5	20.3		5.4				
23			3.7	11.0	19.5	20.3	17.3	4.6				
24			3.7	11.0	19.5	20.3	19.5	4.6				
25			3.7	13.7	20.3	20.3	19.5					
26			3.7	17.3	20.3	20.3	19.5					
27			3.7	19.5	20.3	20.3	20.3					
28			3.7		20.3	20.3	20.3					
29			3.7			20.3	19.5					
30			3.7	13.7		20.3	18.0					
31				17.3		20.3						
1911-12.												
1				11.0	5.9	11.0	14.4	23.4	6.4			
2				12.3	5.4	11.0	14.4	24.2				
3				11.7	5.0	11.0	15.8	24.2				
4				11.0	4.6	11.7		24.2				
5				8.6	5.4	13.0	21.8	24.2				
6				8.6	5.4		22.6	24.2				
7				8.6	6.5		22.6	25.8				
8				8.6	7.5	15.1	22.6.	25.8				
9				8.6	7.5	18.0	24.2	24.2				
10				8.6	6.4		24.2	24.2				
11				11.0	6.4		25.8	24.2				
12				9.8	6.4			24.2				
13				7.5	5.4			24.2				
14				6.4	5.4			24.2				
15				6.4	5.4			24.2				
16				6.4	5.4			24.2				
17				5.4	5.4			22.6				
18				11.0	5.0			25.8				
19				7.5	4.8			25.8				
20				6.4	4.6	11.7		25.8				
21				6.4	4.1	13.7		25.8				
22				6.4	4.8	14.4		25.8				
23				5.4	4.6	14.4		25.8				
24				5.4	4.6	14.4		25.8				
25				5.4	4.1	14.4		25.8				
26				8.6	4.1	14.4		15.1				
27				8.6	4.6			12.3				
28				7.5	4.6	14.4		11.0				
29				7.5	4.6	14.4		8.6				
30				6.4		14.4	22.6	6.4				
31				5.9		14.4						

Digitized by Google

Daily discharge, in second-feet, of Escondido Mutual Water Co.'s canal near Nellie, Cal., for the years ending Sept. 30, 1897–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912–13.												
1			4.9	3.5	6.1	20.8	18.6	2.5				
2			3.8	3.5	6.1	20.0	21.5	1.9				
3			3.5		6.1	19.3	18.6	1.9				
4			2.8		6.1	21.5	17.1	1.9				
5			2.3		11.3	21.5	16.0					
6			2.1		13.8	21.5	15.6					
7			2.1		14.2	21.5	14.9					
8			2.3		17.9	21.5	14.2					
9			2.3		14.9	21.5	13.1					
10			2.3		11.7	20.0	12.0					
11			2.5		10.0	20.0	10.0					
12			2.5		8.7	22.3	10.0					
13			2.5		7.7	22.3	10.0					
14			2.5		7.4	20.8	14.9					
15			2.5		7.1	20.0	12.8					
16			2.5		6.7	20.0	12.8					
17			2.5		6.7	19.3	12.8					
18			2.5		6.7	19.3						
19			2.5	12.8	7.4	19.3	17.5					
20			2.5	10.7	8.0	23.1	13.5					
21			3.5	8.7	14.2	20.0	11.3					
22			3.5	8.7	17.5	20.0	11.3					
23			3.5	8.7	12.8	23.1	10.0					
24			3.5	8.0	18.6	23.1	9.3					
25			3.5	7.7		22.3	9.0					
26			3.5	7.4		22.3	8.4					
27			3.5	7.4		22.3	7.4					
28			3.5	6.7	19.3	21.5	6.1					
29			3.5	6.1		21.5	6.1					
30			3.5	6.1		20.0	6.1					
31			3.5	6.1		20.0						
1913–14.												
1				7.5	36.6		36.6	24.2	8.6			
2				6.4	36.6		36.6	24.2	9.8			
3				5.9	40.4		36.6	29.7	9.8			
4				5.4	36.6	24.2	[a]15.2	29.7	7.5			
5			2.8	5.0	33.5	30.4	18.0	29.0	6.9			
6			2.8	4.6	30.4	38.1	12.3	27.4	7.5			
7			2.8	4.1	28.2	42.7	12.3	24.2	[a]11.1			
8			2.6	3.7	25.8	42.7	12.3	19.5	15.8			
9			2.3	3.7	24.2	42.7	12.3	18.0	10.4			
10			2.3	3.7	22.6	30.4	12.3	17.6	8.6			
11			2.3	3.7	21.8	30.4	12.3	16.5	7.5			
12			2.3	3.7	21.1	38.1	12.3	15.8	6.4			
13			2.3	3.7	18.0	38.1	12.3	15.8	5.9			
14			2.6	3.7	17.2	38.1	12.3	18.7				
15			2.6	7.5	16.5	38.1	12.3	18.0				
16			2.6	15.1	15.8	38.1	[a]15.9	16.5				
17			2.6	24.2	19.5	35.1	18.0	15.8				
18			2.6	18.0	21.1	33.5	16.5	14.4				
19			2.6	39.7		33.5	15.8	13.7				
20			3.7	24.2		32.0	15.1	12.3				
21			3.7	18.0		30.4	9.8	11.7				
22			5.4	12.3		30.4		11.0				
23			7.5	13.7		30.4	12.3	11.0				
24			6.9	13.7		33.5	7.5	11.0				
25			7.5	25.8		33.5	12.3	11.0				
26			7.5	30.4		36.6	12.3	11.0				
27			6.4			36.6	12.3	10.4				
28			6.4			36.6	11.0	9.8				
29			5.9			36.6	12.3	9.2				
30			12.3			36.6	12.3	8.6				
31			9.8	33.5		36.6		8.6				

[a] Mean of a. m. and p. m. readings.

Digitized by Google

Daily discharge, in second-feet, of Escondido Mutual Water Co.'s canal near Nellie, Cal., for the years ending Sept. 30, 1897–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.												
1				6.7	24.2	33.5	16.5	9.8	6.4	22.6		
2			5.0	6.4	24.2	33.5	16.5	12.3	6.4	22.6		
3			3.5	6.2	24.2	33.5	16.5	6.4	6.4	15.1		
4			3.4	8.0	24.2	33.5	16.5	6.4	6.4	18.0		
5			4.1	9.2	29.0	33.5	16.5	6.4	6.4	19.5		
6			3.5	7.7	33.5	33.5	16.5	6.4	6.4	18.0		
7			3.7	7.7	33.5	33.5	16.5	6.4	6.4	18.0		
8			3.5	7.7	33.5	33.5	16.5	6.4	6.4	18.0		
9			3.5	10.1	33.5	33.5	16.5	6.4	9.8	13.7		
10			3.5	9.8	33.5	33.5	16.5	6.4	9.8	13.7		
11			5.6	9.8	33.5	13.7	16.5	6.4	9.8	13.7		
12			22.6	9.8	33.5	11.3	12.3	6.4	9.8	13.0		
13			10.4	9.8	33.5	11.3	16.5	6.4	9.8	13.0		
14			6.7	9.8	33.5	11.3	16.5	6.4	9.8	12.3		
15			5.6	9.8	33.5	11.3	13.7	6.4	9.8	12.3		
16			5.4	9.8	33.5	11.3	13.7	6.4	9.8	11.7		
17			10.7	9.8	33.5	7.5	13.7	6.4	9.8	11.0		
18			25.8	9.8	33.5	11.3	16.5	6.4	9.8	11.0		
19			19.5	9.8	33.5	11.3	16.5	6.4	9.8	10.4		
20			16.1	9.8	33.5	11.3	12.3	6.4	19.5	10.4		
21			16.5	9.8	33.5	11.3	16.5	6.4	19.5	10.1		
22			13.7	9.8	33.5	11.3	16.5	6.4	22.6	9.8		
23			12.0	24.2	33.5	11.3	16.5	6.4	22.6	9.5		
24			10.4	14.7	33.5	11.3	15.1	6.4	22.6	9.2		
25			8.6	32.7	33.5	11.3	15.1	6.4	22.6	8.6		
26			8.3	33.5	33.5	16.5	12.3	6.4	22.6	8.0		
27			9.2	21.8	33.5	16.5	12.3	6.4	21.8	8.6		
28			9.2	27.4	33.5	16.5	16.5	6.4	21.8	8.6		
29			7.7	33.5		16.5	16.5	6.4	22.6	8.0		
30			7.7	33.5		16.5	12.3	6.4	22.6			
31			7.5	33.5		16.5		6.4				

Monthly discharge of Escondido Mutual Water Co.'s canal near Nellie, Cal., for the years ending Sept. 30, 1896–1915.

Month.	Discharge in second-feet.		Run-off (total in acre-feet).
	Maximum.	Minimum.	
1896–7.			
October	12.0	0.85	159
November (29 days)	19.45	3.1	274
December	15.6	4.25	438
January (28 days)	35.05	6.2	997
February (23 days)	37.0	19.45	1,341
March (29 days)	40.85	5.5	1,424
April (25 days)	37.0	12.0	1,174
May (21 days)	8.6	2.05	210
June	.0	.0	0
July	.0	.0	0
August	.0	.0	0
September	.0	.0	0
The year	40.85	.0	6,017
1897–8.			
October	.0	.0	0
November	.0	.0	0
December (28 days)	12.0	3.1	392
January (29 days)	48.8	5.5	1,028
February	37.0	10.2	917
March	37.0	9.4	1,193
April (17 days)	13.8	7.7	351
May	.0	.0	0
June	.0	.0	0
July	.0	.0	0
August	.0	.0	0
September	.0	.0	0
The year	48.8	.0	3,881

Digitized by Google

Monthly discharge of Escondido Mutual Water Co.'s canal near Nellie, Cal., for the years ending Sept. 30, 1896–1915—Continued.

Month.	Discharge in second-feet.		Run-off (total in acre-feet).
	Maximum.	Minimum.	
1898–9.			
October	0.0	0.0	0
November	.0	.0	0
December	.0	.0	0
January (16 days)	6.95	3.6	158
February	35.05	3.6	608
March (30 days)	39.0	4.25	717
April (19 days)	12.9	4.25	282
May	.0	.0	0
June	.0	.0	0
July	.0	.0	0
August	.0	.0	0
September	.0	.0	0
The year	39.00	.0	1,765
1899–1900.			
October	.0	.0	0
November	.0	.0	0
December	.0	.0	0
January	21.45	4.9	498
February	7.3	3.6	351
March	15.6	3.9	356
April	25.4	3.1	438
May (16 days)	31.2	4.95	360
June	.0	.0	0
July	.0	.0	0
August	.0	.0	0
September	.0	.0	0
The year	31.2	.0	2,003
1900–1.			
October	.0	.0	0
November (15 days)	21.45	1.85	293
December (10 days)	3.6	3.1	66
January (26 days)	25.35	3.1	652
February (10 days)	33.1	12.0	542
March (23 days)	25.35	11.1	846
April (11 days)	20.5	14.7	396
May	.0	.0	0
June	.0	.0	0
July	.0	.0	0
August	.0	.0	0
September	.0	.0	0
The year	33.1	.0	2,795
1902–3.			
October	.0	.0	0
November (3 days)	6.5	2.5	26
December (4 days)	9.0	2.0	35
January	25.35	3.6	352
February	27.25	5.5	1,270
March	27.25	13.35	1,310
April (22 days)	27.25	5.5	1,014
May (9 days)	27.25	10.2	230
June	.0	.0	0
July	.0	.0	0
August	.0	.0	0
September	.0	.0	0
The year	27.25	.0	4,237

Digitized by Google

Monthly discharge of Escondido Mutual Water Co.'s canal near Nellie, Cal., for the years ending Sept. 30, 1896–1915—Continued.

Month.	Discharge in second-feet.		Run-off (total in acre-feet).
	Maximum.	Minimum.	
1904–5.			
October	0.0	0.0	0
November	.0	.0	0
December	.0	.0	0
January	.0	.0	0
February	.0	.0	0
March (28 days)	28.3	15.6	1,138
April	28.3	27.2	1,621
May (13 days)	27.25	15.6	676
June	.0	.0	0
July	.0	.0	0
August	.0	.0	0
September	.0	.0	0
The year	28.3	.0	3,435
1905–6.			
October	.0	.0	0
November	.0	.0	0
December	.0	.0	0
January (14 days)	25.35	8.6	448
February (27 days)	27.25	10.2	1,192
March (8 days)	27.25	10.2	282
April	.0	.0	0
May	.0	.0	0
June	.0	.0	0
July	.0	.0	0
August	.0	.0	0
September	.0	.0	0
The year	27.25	.0	1,922
1906–7.			
October (18 days)	7.7	3.1	128
November (3 days)	15.6	8.6	64
December (30 days)	25.35	12.0	1,055
January (4 days)	24.3	12.0	153
February	.0	.0	0
March	.0	.0	0
April	.0	.0	0
May (20 days)	10.2	4.25	278
June	10.2	6.2	504
July (6 days)	5.5	5.5	65
August	.0	.0	0
September	.0	.0	0
The year	25.35	.0	2,247
1907–8.			
October	.0	.0	0
November (5 days)	9.0	8.6	88
December	13.35	8.1	588
January (26 days)	14.7	9.8	612
February (25 days)	12.0	5.5	299
March (28 days)	12.0	5.5	432
April	12.0	12.0	714
May	12.0	7.7	622
June (4 days)	7.7	7.7	53
July	.0	.0	0
August	.0	.0	0
September	.0	.0	0
The year	14.7	.0	3,408

Digitized by Google

Monthly discharge of Escondido Mutual Water Co.'s canal near Nellie, Cal., for the years ending Sept. 30, 1896–1915—Continued.

Month.	Discharge in second-feet.		Run-off (total in acre-feet).
	Maximum.	Minimum.	
1908–9.			
October	0.0	0.0	0
November (6 days)	6.95	6.2	77
December	10.2	6.2	414
January (25 days)	19.45	5.5	544
February (11 days)	23.4	8.6	397
March (22 days)	23.4	9.4	852
April (29 days)	19.45	10.2	798
May	10.2	10.2	627
June	10.2	3.1	363
July (24 days)	2.55	2.05	101
August	.0	.0	0
September	.0	.0	0
The year	23.4	.0	4,173
1909–10.			
October	.0	.0	0
November	.0	.0	0
December	.0	.0	0
January (23 days)	13.0	6.4	502
February	17.3	11.7	797
March (28 days)	17.3	6.4	754
April	7.5	6.4	392
May (29 days)	7.5	4.6	395
June (29 days)	3.0	1.2	105
July (17 days)	1.2	.8	32
August (11 days)	1.2	.8	22
September	.0	.0	0
The year	17.3	.0	2,999
1910–11.			
October	.0	.0	0
November	.0	.0	0
December	3.7	2.3	166
January (23 days)	19.5	3.0	478
February (14 days)	20.3	17.3	543
March (29 days)	20.3	17.3	1,161
April (29 days)	20.3	17.3	1,151
May (24 days)	16.5	4.6	469
June	.0	.0	0
July	.0	.0	0
August	.0	.0	0
September	.0	.0	0
The year	20.3	.0	3,968
1911–12.			0
October	.0	.0	0
November	.0	.0	0
December	.0	.0	0
January	12.3	5.4	494
February	7.5	4.1	305
March (18 days)	18.0	11.0	487
April (11 days)	25.8	14.4	458
May (30 days)	25.8	6.4	1,332
June (1 day)	6.4	6.4	12
July	.0	.0	0
August	.0	.0	0
September	.0	.0	0
The year	25.8	.0	3,088

Digitized by Google

Monthly discharge of Escondido Mutual Water Co.'s canal near Nellie, Cal., for the years ending Sept. 30, 1896–1915—Continued.

Month.	Discharge in second-feet.		Run-off (total in acre-feet).
	Maximum.	Minimum.	
1912–13.			
October	0.0	0.0	0
November	.0	.0	0
December	4.9	2.1	182
January (15 days)	12.8	3.5	222
February (25 days)	19.3	6.1	530
March	23.1	19.3	1,294
April (29 days)	21.5	6.1	716
May (4 days)	2.5	1.9	16
June	.0	.0	0
July	.0	.0	0
August	.0	.0	0
September	.0	.0	0
The year	23.10	.0	2,960
1913–14.			
October	.0	.0	0
November	.0	.0	0
December (27 days)	12.3	2.3	240
January (27 days)	39.7	3.7	676
February (18 days)	40.4	15.8	924
March (28 days)	42.7	24.2	1,951
April (29 days)	18.0	7.5	891
May	29.7	8.6	1,020
June (13 days)	15.8	5.9	230
July	.0	.0	0
August	.0	.0	0
September	.0	.0	0
The year	42.7	.0	5,932
1914–15.			
October	.0	.0	0
November	.0	.0	0
December (30 days)	25.8	3.5	541
January	33.5	6.7	896
February	33.5	24.2	1,773
March	33.5	11.3	1,194
April	16.5	12.3	918
May	12.3	6.4	412
June	22.6	6.4	793
July	22.6	8.0	750
August	.0	.0	0
September	.0	.0	0
The year	33.5	.0	7,277

NOTE.—These tables supersede those previously published in water-supply papers. Discharge in columns headed "Maximum" or "Minimum" corresponds to the maximum or minimum stage recorded during month.

Digitized by Google

SANTA ANA RIVER BASIN.

SANTA ANA RIVER NEAR MENTONE, CAL.

LOCATION.—In the SW. ¼ sec. 4, T. 1 S., R. 2 W., San Bernardino County, near mouth of canyon, one-fourth mile above Pacific Light & Power Corporation's plant, one-half mile above mouth of Deep Creek, and 3½ miles northeast of Mentone.

DRAINAGE AREA.—189 square miles (measured on topographic map); 182 square miles at original site above Warm Spring Canyon.

RECORDS AVAILABLE.—July 1, 1896, to September 30, 1915.

GAGE.—Vertical staff fastened to a rock ledge on left bank one-fourth mile above power house; since October 1, 1914, read by E. Givens; prior to that date gage was just above ford, 1½ miles upstream. Several gages at approximately the same site but at independent datums have been used.

DISCHARGE MEASUREMENTS.—Made from cable just above ford at upper gage or by wading.

CHANNEL AND CONTROL.—Composed of gravel and boulders; shifts during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.4 feet at 8 a. m. February 10 and 11 (discharge determined from extension of rating curve, about 870 second-feet); minimum stage recorded, 5.0 feet September 23 to 30 (discharge, 1 second-foot).

1896–1914: Maximum stage January 1, 1910, when gage was washed out (crest height unknown; mean discharge for day estimated at 8,500 second-feet); minimum stage recorded, 2.3 feet during parts of every month from October, 1913, to January, 1914 (discharge, 0.6 second-foot).

DIVERSIONS.—The intake of the Pacific Light & Power Corporation's canal is at the Southern California Edison Co.'s plant No. 2, 2½ miles above the gage. The Greenspot pipe line diverts water for irrigation from the forebay of this canal at the Mentone power house. From the tailrace the water is carried across Santa Ana River and used for irrigation.

REGULATION.—Water is stored on Bear Creek at Bear Valley reservoir. Southern California Edison Co.'s power plants Nos. 1 and 2 are 5¼ and 2¾ miles, respectively, above the Mentone plant of the Pacific Light & Power Corporation at the mouth of the canyon.

ACCURACY.—Rating curve fairly well defined except for high stages. Gage read only once a day, usually to tenths. Results only fair.

Discharge measurements of Santa Ana River near Mentone, Cal., during the year ending Sept. 30, 1915.

[Made by F. C. Ebert.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 20	[a]1.80	1.7	Mar. 25	6.80	153	May 23	6.97	177
Dec. 23	[a]1.86	1.8	Apr. 8	6.72	115	June 28	6.59	91
Feb. 16	[b]6.77	154	15	6.73	125	July 15	6.45	73
26	[c]6.5	83	May 15	7.1	240	Aug. 12	5.83	11
Mar. 12	6.42	65						

[a] Old gage. [b] Old gage read 5.04 feet. [c] Old gage read 4.98 feet.

Digitized by Google

Daily discharge, in feet, of Santa Ana River near Mentone, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May,	June.	July.	Aug.	Sept.
1	1.7	1.7	1.8	1.8	198	100	121	198	198	100	29	4
2	1.7	1.7	1.8	1.8	121	100	144	260	228	100	29	4
3	1.7	1.7	1.8	1.8	121	100	144	198	228	100	29	4
4	1.7	1.7	1.8	1.8	121	100	170	198	198	100	29	4
5	1.7	1.7	1.8	1.8	121	100	170	198	170	100	29	4
6	1.7	1.7	1.8	1.8	121	100	144	198	170	100	21	3
7	1.7	1.7	1.8	1.8	121	64	121	198	170	100	21	3
8	1.7	1.7	1.8	1.8	121	64	121	198	170	100	21	3
9	1.7	1.7	1.8	1.8	144	64	121	198	170	100	21	2.5
10	1.7	1.7	1.8	1.8	870	64	121	228	170	100	18	2.5
11	1.7	1.7	3.0	1.8	870	64	144	228	170	100	18	2.5
12	1.7	1.7	1.8	1.8	510	64	170	260	170	100	18	2.5
13	1.7	1.7	1.8	1.8	510	64	170	295	144	100	18	2
14	1.7	1.7	1.8	1.8	510	64	170	260	144	81	18	2
15	1.7	1.7	1.8	1.8	144	64	144	260	144	72	18	2
16	1.7	1.7	1.8	46	144	64	144	228	144	72	15	2
17	1.7	1.7	1.8	1.8	144	100	144	260	144	64	15	2
18	1.7	1.7	1.8	1.8	100	100	144	260	144	64	15	2
19	1.7	1.7	1.8	1.8	100	100	170	260	144	64	15	2
20	1.7	1.7	1.8	1.8	100	100	170	260	121	64	10	1.5
21	1.7	1.7	1.8	1.8	100	100	228	260	121	57	5.5	1.5
22	1.7	1.7	3.0	1.8	100	100	170	260	121	57	5.5	1.5
23	1.7	1.7	1.8	1.8	100	144	170	260	121	50	5.5	1
24	1.7	1.7	1.8	1.8	100	144	170	198	121	64	5.5	1
25	1.7	1.7	1.8	1.8	100	170	170	198	121	64	5.5	1
26	1.7	1.7	1.8	1.8	100	144	170	198	121	57	5.5	1
27	1.7	1.7	1.8	1.8	100	121	170	198	121	50	5.5	1
28	1.7	1.7	1.8	1.8	100	121	170	198	100	38	5.5	1
29	1.7	1.7	1.8	330	.....	198	228	198	100	38	5	1
30	1.7	1.7	1.8	198	.....	170	198	198	100	38	5	1
31	1.7	.....	1.8	198	.....	144	.....	198	.....	38	4	.....

NOTE.—Discharge determined as follows: Oct. 1 to Jan. 28, estimated from discharge measurements; Jan. 29 to Sept. 30, from a fairly well defined rating curve.

Monthly discharge of Santa Ana River near Mentone, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1.7	1.7	1.70	105	D.
November	1.7	1.7	1.70	101	D.
December	3.0	1.8	1.88	116	D.
January	330	1.8	26.5	1,630	C.
February	870	100	214	11,900	C.
March	198	64	103	6,330	C.
April	228	121	160	9,520	C.
May	295	198	226	13,900	C.
June	228	100	150	8,930	C.
July	100	38	75.2	4,620	C.
August	29	4.0	15.0	922	C.
September	4	1.0	2.18	130	D.
The year	870	1.0	80.3	58,200	

Digitized by Google

Combined daily discharge, in second-feet, of Santa Ana River and Pacific Light & Power Corporation's canal including Greenspot pipe line near Mentone, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	67	48	43	47	279	172	204	273	283	185	115	89
2	78	48	47	47	202	172	228	335	313	185	115	89
3	78	48	43	47	202	172	228	273	313	185	115	89
4	57	46	47	66	202	163	253	273	283	185	115	89
5	57	46	47	47	202	168	253	273	255	185	115	89
6	57	46	43	47	202	168	227	273	255	185	107	88
7	57	46	43	45	202	138	204	273	255	185	107	88
8	62	46	43	47	202	132	204	273	255	185	107	83
9	55	48	43	47	225	129	204	273	255	185	107	82
10	55	59	43	45	951	144	204	303	255	185	104	82
11	55	59	44	45	936	144	227	312	255	185	104	82
12	55	52	47	45	571	144	254	339	255	185	104	82
13	62	52	43	45	571	144	254	379	229	185	104	82
14	62	52	43	45	582	144	256	344	229	166	104	82
15	62	48	43	47	216	144	230	344	229	157	104	82
16	62	46	43	46	216	144	230	312	229	157	101	82
17	62	48	76	45	216	180	230	344	229	149	99	82
18	62	46	70	45	172	180	230	344	229	149	99	82
19	57	46	61	47	172	180	256	344	229	149	99	78
20	50	48	56	45	172	180	256	344	206	149	94	78
21	51	46	56	49	166	180	276	344	206	142	90	72
22	47	48	60	59	166	181	256	344	206	142	90	72
23	58	48	59	49	166	225	256	344	206	135	90	71
24	58	45	54	47	166	228	254	282	206	149	90	71
25	58	45	49	78	172	254	254	282	206	150	90	77
26	58	44	49	59	172	228	254	282	206	143	90	82
27	58	45	54	54	172	204	245	283	206	136	90	84
28	58	47	45	78	166	204	245	283	185	124	90	84
29	58	47	45	406	.....	282	303	283	185	124	90	76
30	58	43	45	274	.....	254	273	283	185	124	90	70
31	57	.....	41	279	.....	228	.....	283	.....	124	89	.....

NOTE.—See page 95 for table of daily discharge of Pacific Light & Power Corporation's canal near Mentone and page 96 for that of Greenspot pipe line.

Combined monthly discharge of Santa Ana River and Pacific Light & Power Corporation's canal, including Greenspot pipe line, near Mentone, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	78	47	59.1	3,630
November	59	43	47.9	2,850
December	76	41	49.2	3,030
January	406	45	76.5	4,700
February	951	166	287	15,900
March	282	129	181	11,100
April	303	204	242	14,400
May	379	273	307	18,900
June	313	185	235	14,000
July	185	124	160	9,840
August	115	89	100	6,150
September	89	70	81.3	4,840
The year	951	41	151	109,000

NOTE.—See page 96 for table of monthly discharge of Pacific Light & Power Corporation's canal, and page 97 for that of Greenspot pipe line.

Digitized by Google

PACIFIC LIGHT & POWER CORPORATION'S CANAL AND GREENSPOT PIPE LINE NEAR MENTONE, CAL.

LOCATION.—At tailrace of Pacific Light & Power Corporation's plant at mouth of canyon, 2¾ miles below intake on Santa Ana River, and about 3 miles northeast of Mentone, San Bernardino County.

RECORDS AVAILABLE.—1896 to September 30, 1915.

GAGE.—Hook gage at weir on right bank of Santa Ana River about 300 feet west of power house.

DISCHARGE.—Determined from gage heights which give head on 10-foot rectangular weir.

EXTREMES OF DISCHARGE.—1896–1915: Maximum mean daily discharge recorded, 97 second-feet March 16, 1905; no flow during periods in nearly every year.

DIVERSIONS.—Water diverted from the forebay by the Greenspot pipe line must be added to give total flow of canal. The pipe line was put in operation September 7, 1911.

ACCURACY.—Results excellent.

The intake of the Pacific Light & Power Corporation's canal is at Southern California Edison Co.'s power plant No. 2, 2¾ miles above the Mentone plant of the corporation at the mouth of the canyon. All the water, except that taken by the Greenspot pipe line, is first used for develpoment of power; after it leaves the Mentone power house, it is conducted across Santa Ana River in a flume and discharged into a lined canal, from which it is distributed for irrigation. Before it enters the irrigation canal it passes through three power plants.

Daily discharge, in second-feet, of Pacific Light & Power Corporation's canal near Mentone, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	59	41	37	43	79	70	79	70	79	79	79	79
2	70	41	41	43	79	70	79	70	79	79	79	79
3	70	41	37	43	79	70	79	70	79	79	79	79
4	50	39	41	62	79	59	79	70	79	79	79	79
5	50	39	41	43	79	64	79	70	79	79	79	79
6	50	39	37	43	79	64	79	70	79	79	79	79
7	50	39	37	41	79	70	79	70	79	79	79	79
8	55	39	37	43	79	64	79	70	79	79	79	74
9	50	41	37	43	79	64	79	70	79	79	79	74
10	50	52	37	41	79	79	79	70	79	79	79	74
11	50	52	37	41	64	79	79	79	79	79	79	74
12	50	45	41	41	59	79	79	74	79	79	79	74
13	55	45	37	41	59	79	79	79	79	79	79	74
14	55	45	37	41	70	79	79	79	79	79	79	74
15	55	41	37	43	70	79	79	79	79	79	79	74
16	55	39	37	0	70	79	79	79	79	79	79	74
17	55	41	70	41	70	79	79	79	79	79	79	74
18	55	39	64	41	70	79	79	79	79	79	79	74
19	50	39	55	43	70	79	79	79	79	79	79	70
20	45	41	50	41	70	79	79	79	79	79	79	70
21	45	39	50	45	64	79	41	79	79	79	79	64
22	41	41	55	55	64	79	79	79	79	79	79	64
23	50	41	55	45	64	79	79	79	79	79	79	64
24	50	37	50	43	64	79	79	79	79	79	79	64
25	50	37	45	74	70	79	79	79	79	79	79	70
26	50	39	45	55	70	79	79	79	79	79	79	74
27	50	39	50	50	70	79	70	79	79	79	79	74
28	50	41	41	74	64	79	70	79	79	79	79	74
29	50	41	41	74	.....	79	70	79	79	79	79	70
30	50	37	41	74	.....	79	70	79	79	79	79	64
31	50	.....	37	79	.....	79	.....	79	.....	79	79	.....

Digitized by Google

Monthly discharge of Pacific Light & Power Corporation's canal near Mentone, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	70	41	52.1	3,200
November	52	37	41.0	2,440
December	70	37	43.8	2,690
January	79	0	47.9	2,950
February	79	59	71.1	3,950
March	79	59	75.3	4,630
April	79	41	76.5	4,550
May	79	70	75.9	4,670
June	79	79	79.0	4,700
July	79	79	79.0	4,860
August	79	79	79.0	4,860
September	79	64	73.0	4,340
The year	79	0	66.1	47,800

Daily discharge, in second-feet, of Greenspot pipe line near Mentone, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6.0	5.0	4.0	2.0	2.0	2.0	4.5	5.0	6.0	6.0	7.0	6.0
2	6.0	5.0	4.0	2.0	2.0	2.0	4.5	5.0	6.0	6.0	7.0	6.0
3	6.0	5.0	4.0	2.0	2.0	2.0	4.5	5.0	6.0	6.0	7.0	6.0
4	5.0	5.0	4.0	2.0	2.0	4.0	4.0	5.0	6.0	6.0	7.0	6.0
5	5.0	5.0	4.0	2.0	2.0	4.0	4.0	5.0	6.0	6.0	7.0	6.0
6	5.0	5.0	4.0	2.0	2.0	4.0	4.0	5.0	6.0	6.0	7.0	6.0
7	5.0	5.0	4.0	2.0	2.0	4.0	4.0	5.0	6.0	6.0	7.0	6.0
8	5.0	5.0	4.0	2.0	2.0	4.0	4.0	5.0	6.0	6.0	7.0	6.0
9	3.0	5.0	4.0	2.0	2.0	1.0	4.0	5.0	6.0	6.0	7.0	6.0
10	3.0	5.0	4.0	2.0	2.0	1.0	4.0	5.0	6.0	6.0	7.0	6.0
11	3.0	5.0	4.0	2.0	2.0	1.0	4.0	5.0	6.0	6.0	7.0	6.0
12	3.0	5.0	4.0	2.0	2.0	1.0	5.0	5.0	6.0	6.0	7.0	6.0
13	5.0	5.0	4.0	2.0	2.0	1.0	5.0	5.0	6.0	6.0	7.0	6.0
14	5.0	5.0	4.0	2.0	2.0	1.0	7.0	5.0	6.0	6.0	7.0	6.0
15	5.0	5.0	4.0	2.0	2.0	1.0	7.0	5.0	6.0	6.0	7.0	6.0
16	5.0	5.0	4.0	0.0	2.0	1.0	7.0	5.0	6.0	6.0	7.0	6.0
17	5.0	5.0	4.0	2.0	2.0	1.0	7.0	5.0	6.0	6.0	5.3	6.0
18	5.0	5.0	4.0	2.0	2.0	1.0	7.0	5.0	6.0	6.0	5.3	6.0
19	5.0	5.0	4.0	2.0	2.0	1.0	7.0	5.0	6.0	6.0	5.3	6.0
20	3.0	5.0	4.0	2.0	2.0	1.0	7.0	5.0	6.0	6.0	5.3	6.0
21	4.0	5.0	4.0	2.0	2.0	1.0	7.0	5.0	6.0	6.0	5.3	6.0
22	4.0	5.0	2.0	2.0	2.0	2.0	7.0	5.0	6.0	6.0	5.3	6.0
23	6.0	5.0	2.0	2.0	2.0	2.0	7.0	5.0	6.0	6.0	6.0	6.0
24	6.0	6.0	2.0	2.0	2.0	4.5	5.0	5.0	6.0	6.0	6.0	6.0
25	6.0	6.0	2.0	2.0	2.0	4.5	5.0	5.0	6.0	7.0	6.0	6.0
26	1.0	3.0	2.0	2.0	2.0	4.5	5.0	5.0	6.0	7.0	6.0	7.0
27	6.0	4.0	2.0	2.0	2.0	4.5	5.0	6.0	6.0	7.0	6.0	8.5
28	6.0	4.0	2.0	2.0	2.0	4.5	5.0	6.0	6.0	7.0	6.0	8.5
29	6.0	4.0	2.0	2.0	.....	4.5	5.0	6.0	6.0	7.0	6.0	5.0
30	6.0	4.0	2.0	2.0	.....	4.5	5.0	6.0	6.0	7.0	6.0	5.0
31	5.0	.....	2.0	2.0	.....	4.5	.....	6.0	.....	7.0	6.0	.....

Digitized by Google

Monthly discharge of Greenspot pipe line near Mentone, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	6.0	3.0	4.97	306
November	6.0	3.0	4.87	290
December	4.0	2.0	3.35	206
January	2.0	.0	1.94	119
February	2.0	2.0	2.00	111
March	4.5	1.0	2.55	157
April	7.0	4.0	5.35	318
May	6.0	5.0	5.16	317
June	6.0	6.0	6.00	357
July	7.0	6.0	6.23	383
August	7.0	5.3	6.38	392
September	8.5	5.0	6.13	365
The year	8.5	.0	4.59	3,320

MILL CREEK AT FOREST HOME,[1] CAL.

LOCATION.—In the NW. ¼ NE. ¼ sec. 13, T 1 S., R. 1 W., at Forest Home, San Bernardino County, about 2½ miles below Falls Creek, 4 miles above Mountain Home Creek, and 14 miles east of Redlands.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 23, 1903, to September 30, 1915.

DISCHARGE.—Determined by combining results of current-meter measurements in power canal with flow over diverting dam. The flow over the diverting dam is only roughly determined and no report is made when total discharge exceeds 100 second-feet.

EXTREMES OF DISCHARGE.—1903–1915: Maximum mean daily discharge, 368 second-feet February 20, 1914; minimum mean daily discharge, 7.0 second-feet November 19 and 20, 1904.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Daily discharge is mean of two observations recorded every day at 6 a. m. and 6 p. m. Results good for periods in which total flow of creek is diverted into power canal; subject to error for higher stages.

COOPERATION.—Record furnished by Southern California Edison Co., through H. W. Dennis, constructing engineer.

[1] "Akers Camp" on map of San Gorgonio quadrangle, U. S. Geological Survey.

Digitized by Google

Daily discharge, in second-feet, of Mill Creek at Forest Home, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	18.1	16.0	14.8	14.6	19.5	30	40	54	144	87	42	28
2	18.6	15.9	14.6	14.7	21	30	41	54	150	84	39	29
3	22	15.7	14.8	14.6	20	30	43	54	150	87	38	29
4	18.8	15.5	14.7	14.7	19.2	30	48	56	144	87	40	28
5	18.6	15.4	14.7	14.6	18.2	30	72	54	154	80	40	28
6	18.4	15.4	14.5	14.6	17.8	30	52	54	144	82	38	28
7	18.1	15.4	14.5	14.5	17.9	30	52	54	144	74	38	27
8	17.8	15.4	14.6	14.3	17.9	30	50	54	124	72	38	27
9	17.5	16.0	14.4	14.3	34	30	50	57	124	70	38	27
10	17.4	19.5	14.4	14.3	131	30	52	61	130	67	37	27
11	17.3	17.3	14.9	14.2	40	30	52	72	124	64	36	27
12	16.9	16.2	14.6	14.2	30	30	54	80	124	62	34	27
13	16.8	16.1	14.7	14.2	29	30	54	84	124	58	33	27
14	16.5	15.9	14.7	14.2	26	30	54	87	109	55	36	27
15	16.5	15.8	14.6	14.4	28	31	56	90	104	54	33	27
16	16.5	15.8	14.5	13.5	30	32	50	86	113	54	32	26
17	16.4	15.7	21	13.6	32	32	54	108	104	52	32	26
18	16.3	15.5	17.6	13.9	32	33	54	129	102	52	31	25
19	16.2	15.4	15.6	13.8	31	33	54	84	106	52	30	25
20	16.3	15.4	15.0	13.8	31	36	54	84	91	51	30	25
21	17.1	15.3	14.7	14.1	30	36	56	94	102	50	29	24
22	17.0	15.3	16.2	15.1	30	37	56	104	102	50	29	22
23	16.6	19.0	15.4	14.8	30	48	54	99	97	84	29	24
24	16.2	15.1	15.1	15.1	30	39	54	99	89	54	29	24
25	16.2	14.9	14.8	17.3	30	40	56	109	92	50	29	25
26	15.8	15.0	14.9	14.7	30	40	56	114	92	50	30	26
27	16.0	15.0	14.8	14.4	30	40	56	124	87	54	30	25
28	15.8	14.8	14.8	17.7	30	40	57	124	84	55	29	24
29	15.8	14.9	14.6	33	.....	40	60	152	90	48	29	24
30	19.0	14.9	14.5	17.1	.....	40	56	144	87	45	28	24
31	16.3	.....	14.5	18.2	.....	40	.....	144	.....	44	28	.....

NOTE.—Dec. 9 and 10, gage read in morning only; Feb. 11, in evening only; Aug. 10 and 18, no record; discharge interpolated by engineers of the U. S. Geological Survey.

Monthly discharge of Mill Creek at Forest Home, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	22	15.8	17.2	1,060
November	19.5	14.8	15.8	940
December	21	14.4	15.1	928
January	33	13.5	15.4	947
February	131	17.8	30.9	1,720
March	48	30	34.1	2,100
April	72	40	53.2	3,170
May	152	54	89.1	5,480
June	154	84	114	6,780
July	87	44	62.2	3,820
August	42	28	33.4	2,050
September	29	22	26.1	1,550
The year	154	13.5	42.2	30,500

NOTE.—Monthly and yearly discharge computed by engineers of the U. S. Geological Survey.

Digitized by Google

LYTLE CREEK NEAR SAN BERNARDINO, CAL.

LOCATION.—In the NW. ¼ sec. 25, T. 2 N., R. 6 W., at Southern California Edison Co.'s diversion dam, below junction of North and Middle forks of Lytle Creek, in Angeles National Forest, about 3 miles above mouth of canyon, and 14 miles northwest of San Bernardino, San Bernardino County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 18, 1904, to September 30, 1915.

GAGE.—Watson water-stage recorder in pool above weir in power canal.

DISCHARGE.—Computed by combining flow in power canal with flow over diverting dam; discharge of power canal is measured near intake by an 8-foot steel plate rectangular weir; flow over diverting dam is estimated.

EXTREMES OF DISCHARGE.—1904–1915: Maximum mean daily discharge reported, 1,260 second-feet January 18, 1914; minimum mean daily discharge, 5.1 second-feet September 30 and October 3, 1904.

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Daily discharge is mean of two observations recorded every day at 6 a. m. and 6 p. m. Results are good for periods during which total flow of creek is diverted into power canal; above 23 second-feet (capacity of canal) they are subject to error.

COOPERATION.—Daily-discharge record furnished by Southern California Edison Co. through H. W. Dennis, construction engineer.

Daily discharge in second-feet of Lytle Creek near San Bernardino, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Sept.
1	36	36	32	33	63	63	47	43	42	42	45	45
2	36	35	32	33	372	63	47	43	42	42	45	45
3	36	34	32	31	82	63	47	43	42	42	45	45
4	36	34	32	31	53	63	47	43	42	42	45	45
5	36	34	32	31	53	63	47	43	42	42	45	45
6	36	34	32	31	53	63	47	43	42	42	45	45
7	36	34	32	31	53	63	47	43	42	42	45	45
8	36	34	32	31	53	63	47	43	42	42	45	45
9	36	34	32	31	343	63	47	43	42	41	45	45
10	36	34	32	31	253	63	47	43	42	42	45	45
11	36	34	32	30	263	63	45	43	42	44	45	45
12	36	34	32	30	93	63	43	43	42	44	45	45
13	36	34	32	30	98	63	43	43	42	44	45	45
14	36	34	32	30	93	63	43	43	42	45	45	45
15	36	34	32	29	78	63	43	43	42	44	45	45
16	36	34	32	27	73	63	43	43	42	44	45	45
17	36	34	47	27	73	63	43	43	42	45	45	45
18	36	34	37	26	73	63	43	43	42	45	45	45
19	36	34	35	25	73	63	43	43	42	45	45	43
20	36	34	37	25	63	47	42	43	42	45	45	42
21	36	34	39	25	63	47	42	43	42	45	45	41
22	36	34	39	27	63	47	42	43	42	45	45	41
23	36	34	39	24	63	47	42	43	42	45	45	41
24	36	33	37	24	63	47	42	43	42	45	45	43
25	36	32	35	30	78	47	42	42	42	44	45	44
26	36	32	35	28	78	47	42	42	42	45	45	44
27	36	32	35	26	58	47	43	42	42	45	45	43
28	36	32	35	43	53	47	43	42	42	45	45	42
29	36	32	35	323	.....	47	43	42	42	45	45	41
30	36	32	34	123	.....	47	43	42	42	45	45	41
31	36	.....	33	83	.....	47	.....	42	.....	45	45	.....

Digitized by Google

Monthly discharge of Lytle Creek near San Bernardino, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	36	36	36	2,210
November	36	32	33.7	2,010
December	47	32	34.3	2,110
January	323	24	43.5	2,670
February	372	53	103	5,720
March	63	47	56.8	3,490
April	47	42	44.2	2,630
May	43	42	42.8	2,630
June	42	42	42.0	2,500
July	45	41	43.8	2,690
August	45	45	45.0	2,770
September	45	41	43.9	2,610
The year	372	24	47.0	34,000

NOTE.—Monthly and yearly discharge computed by engineers of the U. S. Geological Survey.

SAN ANTONIO CREEK NEAR UPLAND, CAL.

LOCATION.—In the SW. ¼ sec. 36, T. 2 N., R. 8 W., below Pacific Light & Power Corporation's power house, about 4 miles above mouth of canyon, and 8 miles northwest of Upland, San Bernardino County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 11, 1901, to September 30, 1915.

DISCHARGE.—Determined from gage-height record obtained at 10-foot rectangular weir in tailrace; excess water flowing over diverting dam is estimated.

EXTREMES OF DISCHARGE.—1901–1915: Maximum mean daily discharge, 607 second-feet February 21, 1914; minimum mean daily discharge, 3.4 second feet February 29, 1904.

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Capacity of power canal is about 21 second-feet. Results excellent when flow of creek does not exceed capacity of canal.

COOPERATION.—Daily discharge record furnished by Pacific Light & Power Corporation, through H. A. Barre, chief engineer.

Digitized by Google

Daily discharge, in second-feet, of San Antonio Creek near Upland, Cal., for the years ending Sept. 30, 1913 and 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912-13.												
1	9.6	9.0	8 7	8.7	7.1	10.0	10.0	16.0	15.1	10.6	8.7	7.1
2	9.6	8.6	8.7	6.5	7.1	9.5	10.8	16.0	15.1	10.4	8.4	7.1
3	9.0	8.6	8.7	6.5	7.1	9.5	10.8	16.0	15.0	10.4	8.4	7.2
4	11.0	8.6	8.7	6.5	7.1	9.0	10.8	16.4	14.5	10.2	8.3	7.1
5	11.0	8.6	8.7	6.5	7.1	9.0	11.0	16.4	14.5	10.2	8.3	7.0
6	11.0	8.6	8.7	6.5	7.1	9.0	11.7	16.4	14.3	10.2	8.3	7.0
7	10.0	8.6	8.7	6.8	7.1	9.0	11.9	16.4	14.3	9.0	8.0	7.0
8	9.5	8.6	8.7	6.8	11.0	9.0	12.5	16.4	14.3	10.2	8.0	7.0
9	9.5	8.6	8.7	6.8	8.7	9.0	12.7	16.0	13.7	9.9	8.3	6.9
10	9.5	8.6	8.7	6.8	8.2	9.5	12.7	16.0	13.4	9.9	8.3	7.0
11	9.5	8.6	8.7	6.8	8.2	9.5	13.6	15.4	13.4	9.9	8.2	7.0
12	9.5	8.6	8.7	6.8	7.8	9.5	15.0	15.4	13.2	9.9	8.0	7.0
13	9.5	8.6	8.7	6.8	7.8	9.5	15.0	15.2	13.2	9.1	7.6	6.8
14	9.0	8.6	8.7	6.8	7.8	9.5	15,0	15.0	12.9	9.4	7.6	7.0
15	9.0	8.6	8.7	6.8	7.8	9.5	16.2	14.5	12.9	9.4	7.6	6.8
16	9.0	8.6	8.7	9.6	7.8	9.5	16.9	14.5	12.4	8.1	7.6	7.0
17	9.0	8.6	8.7	9.6	7.6	9.5	16.9	14.0	12.4	8.1	7.6	6.8
18	9.0	8.6	8.7	7.6	7.6	9.5	16,9	14.0	12.4	8.8	7.5	6.5
19	9.0	8.6	8.7	7.6	7.6	9.5	17.4	13.5	12.0	8.8	7.5	6.8
20	9.0	8.6	8.7	7.6	7.6	9.5	17.4	13.5	12.0	8.8	7.6	6.8
21	9.0	8.7	8.7	7.6	7.6	9.5	16.9	13.0	11.7	8.9	7.5	6.8
22	9.0	8.7	8.7	7.6	7.6	9.5	16.9	13.0	11.7	8.7	7.5	6.7
23	9.0	8.7	8.7	7.6	8.7	10.0	16.9	13.0	11.7	8.7	7.4	6.8
24	9.0	8.7	8.7	7.6	11.0	10.0	16.9	14.3	11.4	8.8	7.4	6.7
25	9.0	8.7	8.7	7.1	12.5	10.0	16.5	15.1	11.4	9.2	7.5	6.7
26	9.0	8.7	8.7	7.1	12.3	10.0	16.5	15.6	11.4	9.2	7.4	6.7
27	9.0	8.7	8.7	7.1	10.9	10.0	16.5	15.6	11.4	9.2	7.4	6.7
28	9.0	8.7	8.7	7.1	10.9	10.0	16.0	16.0	11.4	9.0	7.4	6.7
29	9.0	8.7	8.7	7.1	.....	10.0	16.0	15.6	11.1	8.7	7.1	6.7
30	9.0	8.7	8.7	7.1	.....	10.0	16.0	15.6	11.1	8.7	7.2	6.7
31	9.0	.....	8.7	7.1	.....	10.0	.....	15.6	.....	8.7	7.1	.....
1914-15.												
1	14.5	12.4	10.8	10.9	18.0	59	31	43	43	33	23	19.1
2	14.3	12.4	10.8	10.9	23	59	35	46	45	33	22	19.1
3	15.3	12.4	10.8	10.9	29	59	35	46	43	33	22	19.1
4	13.9	12.1	10.8	10.9	25	59	35	46	43	33	22	18.6
5	13.1	12.1	10.8	10.9	23	59	35	46	43	33	22	18.6
6	14.3	12.1	10.8	10.9	23	59	35	46	43	31	22	18.6
7	13.9	12.1	10.8	10.9	21	54	35	46	43	31	22	18.3
8	13.9	11.8	10.8	10.9	21	53	35	46	43	31	21	18.0
9	13.9	11.8	10.5	10.9	22	53	35	43	43	31	21	17.7
10	13.9	11.8	10.5	10.9	118	49	35	43	43	29	21	17.7
11	13.9	12.1	10.5	10.9	108	49	35	43	41	29	21	17.4
12	13.2	12.1	10.8	10.9	108	49	35	43	41	27	21	17.1
13	13.2	11.8	10.8	10.3	108	47	35	43	41	27	19.6	17.1
14	13.2	11.8	10.5	10.3	99	47	35	43	39	27	19.6	17.1
15	13.2	11.8	10.5	9.8	79	45	35	43	39	27	19.6	17.1
16	12.9	11.4	10.3	10.3	79	45	35	43	39	27	19.6	16.7
17	12.9	11.4	13.6	9.8	79	43	35	43	39	27	19.6	16.0
18	12.9	11.0	12.3	9.6	69	39	35	43	37	26	19.6	16.0
19	12.6	11.0	10.9	9.8	69	39	35	47	37	26	19.6	14.7
20	12.6	11.0	10.5	9.8	69	39	35	47	37	26	19.1	14.3
21	12.6	11.0	10.9	9.6	65	39	35	47	37	26	19.1	15.2
22	12.1	11.0	10.9	10.3	65	35	35	45	37	25	19.1	15.2
23	12.6	10.8	10.5	9.8	65	35	35	45	37	25	18.9	15.0
24	12.6	10.8	10.5	9.6	65	35	35	45	37	25	19.1	15.3
25	12.6	10.8	10.5	9.8	65	35	35	45	37	24	18.6	16.0
26	12.4	10.8	10.5	9.8	65	35	35	45	37	24	18.0	15.2
27	12.4	10.5	10.9	9.8	59	35	35	45	35	24	21	14.7
28	12.6	10.8	10.9	9.8	59	35	35	45	35	23	19.6	14.1
29	12.4	10.8	10.9	42	.....	36	35	45	33	23	19.1	14.3
30	12.6	10.8	10.9	39	.....	36	43	45	33	23	19.1	14.1
31	12.6	.....	10.9	16	.....	35	.....	43	.....	23	19.1	.....

NOTE.—No record Nov. 20, 21, 28, 29, Dec. 1, 1912, and May 13, 1913; discharge interpolated by U. S. Geol. Survey.

Digitized by Google

Monthly discharge of San Antonio Creek near Upland, Cal., for the years ending Sept. 30, 1913 and 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
1912–13.				
October	11.0	9.0	9.36	576
November	9.0	8.6	8.65	515
December	8.7	8.7	8.70	535
January	8.7	6.5	7.24	445
February	12.5	7.1	8.45	469
March	10.0	9.0	9.56	588
April	17.4	10.0	14.7	875
May	16.4	13.0	15.1	928
June	15.1	11.1	12.8	762
July	10.6	8.1	9.33	574
August	8.7	7.1	7.76	477
September	7.1	6.5	6.87	409
The year	17.4	6.5	9.88	7,150
1914–15.				
October	15.3	12.1	13.2	812
November	12.4	10.5	11.5	684
December	13.6	10.3	10.9	670
January	42	9.6	12.5	769
February	118	18.0	60.6	3,370
March	59	35	45.0	2,770
April	43	31	35.1	2,090
May	47	43	44.6	2,740
June	45	33	39.3	2,340
July	33	23	27.5	1,690
August	23	18.0	20.2	1,240
September	19.1	14.1	16.6	988
The year	118	9.6	27.8	20,200

NOTE.—Monthly and yearly discharge computed by engineers of the U. S. Geological Survey.

SAN GABRIEL RIVER BASIN.

SAN GABRIEL RIVER NEAR AZUSA, CAL.

LOCATION.—In the NW. ¼ sec. 23, T. 1 N., R. 10 W., Los Angeles County, near road crossing at mouth of canyon, about one-half mile above Pacific Light & Power Corporation's power house and 2 miles north of Azusa.

DRAINAGE AREA.—222 square miles.

RECORDS AVAILABLE.—1894 to September 30, 1915.

GAGE.—Staff; read daily by J. G. Woodward. Original gage was just above ford at mouth of canyon, but many changes in gage and location have been necessitated by the frequent changes in channel. The position of the station has varied from 1,000 feet above ford to 600 feet below, and most of the gages have been installed at independent datums. Gage used January 29 to March 12, 1915, was installed in 1911 on left bank just above ford; a new gage on left bank 100 feet downstream was read March 13 to June 15 and a new gage on left bank 600 feet below ford was read from June 16 to July 26.

DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet above ford or by wading near gage.

CHANNEL AND CONTROL.—Composed of gravel and bowlders; shifting during high water.

EXTREMES OF DISCHARGE.—Maximum stage during year from high-water mark, 7.8 feet January 29 (discharge, computed from extension of rating curve, about 2,770 second-feet). No flow for several months during the year.

1894–1915: Maximum stage recorded, 11.7 feet February 20, 1914 (discharge, 18,100 second-feet). No flow for several months every year.

DIVERSIONS.—The power canal of the Pacific Light & Power Corporation heads about 5 miles above the station. From June 2 to July 26 water was diverted through the tunnel about 500 feet above ford.

Digitized by Google

REGULATION.—None.

ACCURACY.—Results only fair from December to March as rating curve is not well defined; good for remainder of year. The diversion through tunnel above gage was estimated by observer and is included in the table of combined discharge of river and canals.

Discharge measurements of San Gabriel River near Azusa, Cal., during the year ending Sept. 30, 1915.

[Made by F. C. Ebert.]

Date.	Gage height.[a] 1	2	3	Discharge.	Date.	Gage height.[a] 1	2	3	Discharge.
	Feet.	*Feet.*	*Feet.*	*Sec.-ft.*		*Feet.*	*Feet.*	*Feet.*	*Sec.-ft.*
Dec. 23	0.94	.....	.....	23	Mar. 24	.....	4.73	.....	262
28	(b)	.....	.....	2.1	Apr. 9	.....	4.67	.....	220
Feb. 18	5.95	.....	.....	420	25	.....	4.52	.....	166
22	5.80	.....	.....	351	May 13	.....	4.84	.....	286
25	5.85	.....	.....	404	June 15	.....	4.13	1.86	69
Mar. 13	5.56	4.79	.....	256	28	.....	.....	1.48	23
17	5.62	4.85	.....	274	July 5	.....	.....	1.48	27
22	5.54	4.72	.....	262	17	.....	.....	1.16	3.5

[a] 1, Old gage installed in 1911 on left bank just above ford; 2, new gage on left bank 100 feet downstream from old; 3, new gage on left bank 600 feet below ford.
[b] Stream flowing down wagon road by-passing the gage.

Daily discharge, in second-feet, of San Gabriel River near Azusa, Cal., for the year ending Sept. 30, 1915.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	.....	.....	65	400	230	270	178	18
2	.....	.....	1,000	355	230	270	162	54
3	.....	.....	510	315	250	270	147	32
4	.....	.....	275	275	250	270	132	27
5	.....	.....	150	275	250	270	119	27
6	.....	.....	120	275	230	270	106	22
7	.....	.....	90	258	230	270	106	18
8	.....	.....	65	240	212	270	106	14
9	.....	.....	1,000	240	212	270	94	11
10	.....	.....	1,110	240	212	270	94	8
11	.....	.....	1,000	225	194	270	82	5
12	.....	.....	900	210	194	270	82	5
13	.....	.....	730	256	212	270	72	5
14	.....	.....	580	256	212	270	72	5
15	.....	.....	510	256	194	250	72	5
16	.....	.....	450	256	178	250	54	3
17	50	.....	450	274	178	270	48	3
18	25	.....	425	274	178	250	48	3
19	20	.....	378	256	178	230	48	3
20	15	.....	450	256	178	230	48	3
21	25	.....	378	259	194	230	48	3
22	15	.....	335	262	178	212	48	3
23	23	.....	295	262	178	212	42	3
24	15	.....	400	262	178	212	40	3
25	15	.....	378	262	162	212	37	1.5
26	10	.....	355	262	162	212	37	1.5
27	4	.....	315	262	162	212	32	.....
28	2	.....	275	290	194	194	22	.....
29	.....	1,350	.....	270	230	194	18	.....
30	.....	240	.....	250	230	194	18	.....
31	.....	120	.....	250	.....	178	.....	.....

NOTE.—Discharge determined from rating curves as follows: Jan. 29 to Mar. 12, fairly well defined above 200 second-feet; Mar. 28 to June 15, well defined; and June 16 to July 26, well defined. Discharge Dec. 17–28, estimated from current meter measurements and observer's notes; Mar. 13–27, estimated from measurements. No flow Oct. 1 to Dec. 16, Dec. 29 to Jan. 28, and July 27 to Sept. 30.

Digitized by Google

Monthly discharge of San Gabriel River near Azusa, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	0	0	0	0	
November	0	0	0	0	
December	50	0	7.1	437	D.
January	1,350	0	55.2	3,390	D.
February	1,110	65	464	25,800	C.
March	400	210	267	16,400	C.
April	250	162	202	12,000	B.
May	270	178	243	14,900	B.
June	178	18	73.7	4,390	C.
July	54	0	9.23	568	C.
August	0	0	0	0	
September	0	0	0	0	
The year	1,350	0	108	77,900	

Combined daily discharge, in second-feet, of San Gabriel River and canals near Azusa, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	43	46	56	66	145	480	320	360	268	138	90	61
2	44	46	58	66	1,080	435	320	360	272	164	90	58
3	50	43	51	66	590	395	340	360	267	126	90	60
4	51	41	50	70	355	355	340	360	252	137	84	58
5	50	41	51	70	230	355	340	360	239	137	76	56
6	49	40	55	68	200	355	320	360	226	132	76	55
7	50	40	52	65	170	338	320	360	226	128	69	57
8	49	40	51	64	145	320	302	360	226	124	68	58
9	49	41	49	65	1,080	320	302	360	214	121	68	56
10	47	44	54	64	1,190	320	302	360	214	118	66	56
11	45	45	67	63	1,080	305	284	360	202	115	64	56
12	46	44	66	62	960	290	284	360	202	115	62	56
13	43	43	63	61	810	336	302	360	192	115	64	58
14	43	42	58	60	660	336	302	360	192	115	63	60
15	41	42	56	61	590	336	284	340	192	115	62	59
16	40	42	55	60	530	336	268	340	174	113	62	56
17	42	41	125	59	530	354	268	360	168	113	60	55
18	42	39	95	59	505	354	268	340	168	113	58	52
19	43	38	90	59	458	336	268	320	168	113	56	50
20	43	38	83	59	530	336	268	320	168	113	56	51
21	47	38	95	57	458	339	284	320	168	113	55	50
22	48	39	85	59	415	342	268	302	168	109	53	48
23	47	39	93	59	375	342	268	302	162	109	53	48
24	44	39	85	58	480	352	268	302	160	103	53	49
25	43	39	85	70	458	352	252	302	157	98	52	55
26	42	39	80	70	435	352	252	302	157	98	52	57
27	41	39	74	67	395	352	252	283	152	90	55	56
28	40	39	72	70	355	380	264	284	142	90	66	54
29	42	41	70	1,430	.....	360	300	284	138	90	64	51
30	44	42	70	320	.....	340	300	284	138	90	62	50
31	46	.....	68	200	.....	340	.....	268	.....	90	60	.....

NOTE.—See page 106 for table of daily discharge of Pacific Light & Power Corporation's canal near Azusa. There is no separate table for the other diversion.

Digitized by Google

Combined monthly discharge of San Gabriel River and canals near Azusa, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	51	40	45.0	2,770
November	46	38	41.0	2,440
December	125	49	69.7	4,290
January	1,430	57	120	7,380
February	1,190	145	544	30,200
March	480	290	350	21,500
April	340	252	290	17,300
May	360	268	332	20,400
June	272	138	192	11,400
July	164	90	114	7,010
August	90	52	64.8	3,980
September	61	48	54.9	3,270
The year	1,430	38	182	132,000

NOTE.—Monthly and yearly discharge computed by engineers of the U. S. Geological Survey. See p. 106 for monthly and yearly discharge of Pacific Light & Power Corporation's canal near Azusa. There is no separate table for the other diversion.

PACIFIC LIGHT & POWER CORPORATION'S CANAL NEAR AZUSA, CAL.

LOCATION.—At Pacific Light & Power Corporation's power house, 1½ miles north of Azusa, Los Angeles County, and about 9 miles below intake on San Gabriel River.

RECORDS AVAILABLE.—1896 to September 30, 1915.

DISCHARGE.—Computed from records showing kilowatt output of plant, except at low water, when record at power plant is not reliable. Low-water discharge computed from weir records obtained at sand box about one-fourth mile below intake.

EXTREMES OF DISCHARGE.—1896–1915: Maximum mean daily discharge recorded, 90 second-feet during most of the period March 24 to August 3, 1915; no flow during periods in 1901 and 1912.

ACCURACY.—Results good.

The diversion dam for this canal is on San Gabriel River in the SE. ¼ SE. ¼ sec. 31, T. 2 N., R. 9 W., about 5 miles above gaging station on San Gabriel River near Azusa, at the mouth of the canyon. The water is used for power development at a point about 1½ miles north of Azusa and after leaving the power plant is divided for irrigation, a part being discharged into Azusa-Covina canal and the remainder into Duarte canal. During the rainy season part of the water from the power plant is wasted into San Gabriel River below the gaging station.

Digitized by Google

Daily discharge, in second-feet, of Pacific Light & Power Corporation's canal near Azusa, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	43	46	56	66	80	80	90	90	90	90	90	61
2	44	46	58	66	80	80	90	90	90	90	90	58
3	50	43	51	66	80	80	90	90	90	90	90	60
4	51	41	50	70	80	80	90	90	90	90	84	58
5	50	41	51	70	80	80	90	90	90	90	76	56
6	49	40	55	68	80	80	90	90	90	90	76	55
7	50	40	52	65	80	80	90	90	90	90	69	57
8	49	40	51	64	80	80	90	90	90	90	68	58
9	49	41	49	65	80	80	90	90	90	90	68	56
10	47	44	54	64	80	80	90	90	90	90	66	56
11	45	45	67	63	80	80	90	90	90	90	64	56
12	46	44	66	62	80	80	90	90	90	90	62	56
13	43	43	63	61	80	80	90	90	90	90	64	58
14	43	42	58	60	80	80	90	90	90	90	63	60
15	41	42	56	61	80	80	90	90	90	90	62	59
16	40	42	55	60	80	80	90	90	90	90	62	56
17	42	41	75	59	80	80	90	90	90	90	60	55
18	42	39	70	59	80	80	90	90	90	90	58	52
19	43	38	70	59	80	80	90	90	90	90	56	50
20	43	38	68	59	80	80	90	90	90	90	56	51
21	47	38	70	57	80	80	90	90	90	90	55	50
22	48	39	70	59	80	80	90	90	90	90	53	48
23	47	39	70	59	80	80	90	90	90	90	53	48
24	44	39	70	58	80	90	90	90	90	90	53	49
25	43	39	70	70	80	90	90	90	90	90	52	55
26	42	39	70	70	80	90	90	90	90	90	52	57
27	41	39	70	67	80	90	90	71	90	90	55	56
28	40	39	70	70	80	90	70	90	90	90	66	54
29	42	41	70	80	.....	90	70	90	90	90	64	51
30	44	42	70	80	.....	90	70	90	90	90	62	50
31	46	.....	68	80	.....	90	.....	90	.....	90	60	.....

Monthly discharge of Pacific Light & Power Corporation's canal near Azusa, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	51	40	45.0	2,770
November	46	38	41.0	2,440
December	75	49	62.7	3,860
January	80	57	65.1	4,000
February	80	80	80.0	4,440
March	90	80	82.6	5,080
April	90	70	88.0	5,240
May	90	71	89.4	5,500
June	90	90	90.0	5,360
July	90	90	90.0	5,530
August	90	52	64.8	3,980
September	61	48	54.9	3,270
The year	90	38	71.1	51,500

Digitized by Google

LOS ANGELES RIVER BASIN.

ARROYO SECO NEAR PASADENA, CAL.

LOCATION.—Near south line of sec. 30, T. 2 N., R. 12 W. (unsurveyed), just below trail crossing at forest ranger's station in Angeles National Forest, Los Angeles County, about 3 miles above Devils Gate and 5½ miles northwest of Pasadena.

DRAINAGE AREA.—16.4 square miles.

RECORDS AVAILABLE.—December 1, 1910, to September 30, 1915.

GAGE.—Staff in two sections fastened to an alder tree on right bank 300 feet southeast of ranger station; read twice daily by R. C. Doughty, forest ranger.

DISCHARGE MEASUREMENTS.—Made by wading below gage.

CHANNEL AND CONTROL.—Composed of solid rock, gravel, and boulders; shifts slightly during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.6 feet at 7 a. m. February 3 (discharge, computed from extension of rating curve, 634 second-feet); minimum stage recorded, 2.94 feet October 19 to 22 at 5.30 p. m. (discharge, 0.5 second-foot).

1910–1915: Maximum stage recorded, 12.5 feet February 20, 1914 (discharge, 5,630 second-feet); minimum stage recorded, somewhat below 2.98 feet, the lower limit of gage, September 12 to 23, 1913 (estimated discharge, 0.1 second-foot).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Results for low and medium stages good. High-water extension of rating curve based on cross section of channel and on slope data obtained after the flood of February, 1914. Results for high stages, fair.

Discharge measurements of Arroyo Seco near Pasadena, Cal., during the year ending Sept. 30, 1915.

[Made by F. C. Ebert.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 7	3.25	2.0	Mar. 15	3.56	15	June 15	3.22	4.0
Feb. 18	3.72	22	22	3.46	11	July 3	3.12	2.6
25	3.84	30	Apr. 26	3.34	7.1			

Digitized by Google

Daily discharge, in second-feet, of Arroyo Seco near Pasadena, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1	2.5	1	1	22	30	10	17	7	2	1	0.8
2	1	2	2	1	117	29	10	16	7	2	.9	.8
3	1.5	1.5	1.5	1	435	26	10	17	6.5	2	.9	.8
4	1.5	1	1	1	72	25	11	21	6.5	2	.8	.8
5	1.5	1	1	1	26	23	12	22	6	2	.8	.8
6	1.5	1	1	1	21	23	10	18	6	2	.8	.8
7	1	.8	1	1	18	22	9	16	6	1.5	.8	.8
8	1.5	.8	1	1	16	21	9	15	6	1.5	.8	.8
9	1.5	.9	1.5	1	200	19	9	14	6	1.5	.8	.8
10	1.5	.8	3.5	1	238	18	9	13	6	1.5	.8	.8
11	1.5	.8	3.5	1	130	17	9	12	6	1.5	.8	.8
12	1.5	.7	3	1	62	16	8.5	12	6	1.5	.8	.8
13	1.5	.5	2.5	1	50	16	9	12	5.5	1.5	.8	.8
14	1.5	.8	2.5	1	41	16	10	11	5.5	1.5	.7	.8
15	1.5	.3	2.5	1	26	15	9	11	5.5	1.5	.7	.8
16	1.5	.3	4	1.5	24	15	8	11	5	1.5	.7	.8
17	1.5	.2	28	1.5	23	14	8	11	5	1.5	.6	.8
18	1.5	.2	30	1	22	14	7.5	10	4.5	1	.7	.8
19	1.5	.3	32	1	21	14	7	10	4	1	.6	.8
20	1.5	.3	31	1	26	13	6.5	9.5	3.5	1	.6	.8
21	2	.3	33	1	23	13	7.5	9	3.5	1	.5	.8
22	2	.3	41	1	23	12	8	9	3.5	1	.5	.8
23	1.5	.3	42	1	22	12	8	9	3.5	1	.8	.8
24	1.5	.3	36	1	32	11	7.5	9	3	1	.9	.9
25	1.5	.3	30	4	37	11	7.5	8.5	3	1	.8	.9
26	1.5	.3	25	3	26	11	7.5	8	3	1	.8	.9
27	1.5	.3	17	3.5	20	11	7.5	8	2.5	1	.8	.9
28	1.5	.3	11	12	22	16	10	8	2.5	1	.8	.9
29	2.5	.4	6.5	349	.....	12	17	7.5	2.5	1.	.7	.9
30	2.5	.5	3.5	223	.....	11	17	7.5	2	1	.7	.8
31	2.5	.....	2.5	77	.....	10	.....	7.5	.....	1	.7	.....

NOTE.—Discharge determined from two rating curves as follows: Oct. 1 to Feb. 3, poorly defined; Feb. 4 to Sept. 30, well defined between 1 and 200 second-feet.

Monthly discharge of Arroyo Seco River near Pasadena, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	2.5	1.0	1.58	97	D.
November	2.5	.2	.67	40	D.
December	42	1.0	12.9	793	C.
January	349	1.0	22.5	1,380	C.
February	435	16	64.1	3,560	B.
March	30	10	16.6	1,020	B.
April	17	6.5	9.30	553	B.
May	22	7.5	11.9	732	B.
June	7.0	2.0	4.75	283	C.
July	2.0	1.0	1.37	84	D.
August	1.0	.5	.75	46	D.
September	.9	.8	.82	49	D.
The year	435	.2	11.9	8,640	

SANTA YNEZ RIVER BASIN.

SANTA YNEZ RIVER NEAR SANTA BARBARA, CAL.

LOCATION.—In the SE. ¼ SE. ¼ sec. 10, T. 5 N., R. 27 W., one-fourth mile below Gibraltar dam site, about 7 miles north of Santa Barbara, Santa Barbara County. Mono Creek enters 3½ miles above the station.

DRAINAGE AREA.—218 square miles (measured on topographic map).

RECORDS AVAILABLE.—November 1, 1903, to April 30, 1907; October 1, 1907, to January 31, 1908; February 6, 1910, to March 31, 1915. For station about 5 miles above present site, November 21, 1902, to June 20, 1903.

Digitized by Google

GAGE.—Staff in three sections about 900 feet below north portal of the Santa Barbara water-supply tunnel. On April 13, 1911, gage datum was lowered 5.00 feet.

DISCHARGE MEASUREMENTS.—Made by wading at various sections from 1 mile above gage to 400 feet below gage.

CHANNEL AND CONTROL.—Sand and gravel; shifts greatly during extremely high water; relatively permanent at low water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.40 feet at 7 a. m., February 9 (discharge, computed from extension of rating curve, about 3,340 second-feet); minimum stage, not known; no gage-height record August 16 to September 30.

1904–1915: Maximum stage recorded, 23.0 feet at 8 p. m., January 25, 1914 (discharge, 13,100 second-feet); no flow during most of July to September, 1904.

DIVERSIONS.—None.

REGULATIONS.—None.

ACCURACY.—Results good except for high stages when no current-meter measurements were made. Discharge interpolated between measurements when change in stage was very gradual; for other periods, estimated from current-meter measurements or computed by indirect method for shifting control. Only one measurement was made after March 31; discharge April 1 to September 30 not determined. Gage not read August 16 to September 30.

Discharge measurements of Santa Ynez River near Santa Barbara, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 6	W. M. Coffey	4.10	1.8
6	do	4.10	2.2
6	do	4.10	2.0
7	do	4.10	1.9
Nov. 7	do	4.14	2.9
8	do	4.14	2.7
13	do	4.15	2.7
Dec. 21	F. E. Thompson	4.46	24
22	do	4.44	19
23	do	4.41	18
24	do	4.40	16
25	do	4.38	16
26	do	4.37	16
27	do	4.37	15
28	do	4.35	14
29	do	4.35	14
30	do	4.33	13
31	do	4.33	13
Jan. 1	do	4.32	13
2	do	4.32	13
3	do	4.32	13
4	do	4.32	13
5	do	4.32	13
6	do	4.32	12
7	do	4.32	12
8	do	4.32	12
9	do	4.38	16
10	do	4.35	14
11	do	4.33	14
12	do	4.33	13
13	do	4.32	13
14	do	4.32	12
15	do	4.32	12
16	do	4.32	12
17	do	4.32	12
18	do	4.31	12
19	F. C. Ebert	4.30	10
19	F. E. Thompson	4.30	10
20	do	4.30	11
21	do	4.30	10
22	do	4.30	11
23	do	4.30	10
24	do	4.30	10
25	do	4.35	12
26	do	4.35	13
27	do	4.36	13
28	do	4.50	24
31	do	5.73	202
Feb. 1	F. E. Thompson	5.50	190
5	do	5.40	171
6	do	5.34	129
7	do	5.18	120
8	do	4.96	99
16	do	5.66	334
17	do	6.05	503
18	do	5.88	428
19	do	5.64	356
20	do	5.64	341
21	do	5.64	350
22	do	5.56	294
23	do	5.42	276
24	do	5.64	350
25	do	5.70	373
26	do	5.58	325
27	do	5.49	309
28	do	5.42	288
Mar. 1	do	5.50	309
2	R. B. Whitman	5.45	282
3	do	5.39	283
4	do	5.32	262
5	do	5.30	237
6	do	5.28	229
7	do	5.24	210
8	do	5.21	218
9	do	5.19	203
10	do	5.15	185
11	do	5.10	183
12	do	5.10	178
13	do	5.08	164
14	do	5.05	159
15	do	5.03	152
16	do	5.01	145
17	do	5.00	130
18	do	4.99	123
19	do	4.98	120
20	do	4.97	117
21	do	4.95	111
22	do	4.94	112
23	do	4.93	106
27	do	4.89	97
28	do	5.22	170
29	do	5.17	187
30	do	5.00	133
31	do	4.98	117
Apr. 21	E. Pyzel	4.68	64

Digitized by Google

Daily discharge, in second-feet, of Santa Ynez River near Santa Barbara, Cal., for the period Oct. 1, 1914, to Mar. 31, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1	2	3	15	13	190	309	16	2	2.5	12	12	320	145
2	2	3	9.5	13	1,560	282	17	2	2.5	46	12	570	130
3	2	3	7.5	13	520	283	18	2.5	2.5	28	12	428	123
4	2	3	9	13	325	262	19	2.5	2.5	28	10	356	120
5	2	3	9	13	171	237	20	2.5	2.5	26	11	341	117
6	2	3	9.5	12	129	229	21	2.5	2.5	24	10	350	117
7	2	3	9	12	114	210	22	2.5	2.5	19	11	294	112
8	2	2.5	8	12	113	218	23	2.5	2.5	18	10	276	106
9	2	2.5	8.5	16	2,360	203	24	2.5	2.5	16	10	360	104
10	2.5	2.5	14	14	1,130	185	25	2.5	2.5	16	12	373	102
11	2	2.5	28	14	900	183	26	2.5	2.5	16	13	325	100
12	2	2.5	35	13	710	178	27	2.5	2.5	15	13	309	97
13	2	2.5	31	13	570	164	28	2.5	4	14	36	305	190
14	2	2.5	16	12	455	159	29	2.5	3	14	1,020	.....	187
15	2	2.5	14	12	370	152	30	3	2.5	13	395	.....	133
							31	3	.....	13	207	.....	117

Monthly discharge of Santa Ynez River near Santa Barbara, Cal., for the period Oct. 1, 1914, to Mar. 31, 1915.

[Drainage area, 218 square miles.]

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	3	2	2.27	140	D.
November	4	2.5	2.68	159	D.
December	46	7.5	17.5	1,080	C.
January	1,020	10	64.2	3,950	C.
February	2,360	113	508	28,200	C.
March	309	97	169	10,400	B.

SANTA YNEZ RIVER NEAR LOMPOC, CAL.

LOCATION.—At highway bridge near east boundary of La Misión Vieja de la Purísima grant, Santa Barbara County, about 1½ miles east of Lompoc.

DRAINAGE AREA.—725 square miles.

RECORDS AVAILABLE.—November 10, 1906, to January 9, 1907, and September 25, 1907, to September 30, 1915.

GAGE.—Vertical staff fastened to pier of bridge, lower section at right end of center span and upper section at left end; read once a day by Donald McDonald. During high water additional readings are taken.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Composed of sand, which scours out during high water and fills in again as the flow decreases.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.5 feet at 6.30 a. m. February 9 (discharge, about 41,500 second-feet, computed from extension of rating curve); minimum stage recorded, −0.25 foot October 12 and 13 (discharge, 24 second-feet).

1906–1915: Maximum stage recorded, 13.0 feet January 25, 1914 (discharge 41,800 second-feet); minimum discharge, 5 second-feet October 13 to 21, 1913.

DIVERSIONS.—Water is not diverted above the station, but there is some pumping from wells along the banks of the river for irrigation purposes.

REGULATION.—None.

ACCURACY.—Results fair. Frequent discharge measurements were made and extra gage-height observations furnished during high-water period. Daily discharge interpolated between measurements during low water, when change in stage was very gradual. For remainder of year discharge computed by indirect method and from rating curves covering short periods.

Digitized by Google

Discharge measurements of Santa Ynez River near Lompoc, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 5	Donald McDonald	−0.25	25	Mar. 29	Donald McDonald	1.10	522
10	do	−.25	26	Apr. 5	do	.85	310
12	do	−.25	24	12	do	.85	305
19	do	−.25	29	17	do	.86	267
26	do	−.28	27	19	do	.90	256
Nov. 7	do	−.25	31	26	do	.82	264
9	do	−.25	33	May 3	do	.95	367
16	do	−.22	32	6	do	1.30	860
23	do	−.22	30	11	do	1.10	433
30	do	−.22	28	18	do	1.00	304
Dec. 7	do	−.10	49	24	do	.90	245
12	do	.00	83	June 3	do	.80	144
14	do	.00	83	3	Ewald Pyzel	.80	156
21	do	.05	111	7	Donald McDonald	.78	164
28	do	−.10	85	12	do	.78	143
Jan. 4	do	−.05	75	14	do	.75	126
11	do	−.10	73	21	do	.70	129
16	do	−.10	71	29	do	.72	85
18	do	−.10	77	July 5	do	.70	96
20	do	−.12	64	10	do	.70	77
20	F. C. Ebert	−.12	70	12	do	.68	85
25	Donald McDonald	−.10	76	Aug. 2	do	.62	57
Feb. 1	do	.75	828	7	do	.60	44
6	do	.70	837	9	do	.60	46
9	do	4.85	37,900	16	do	.60	46
15	do	1.05	1,590	23	do	.60	47
22	do	.85	1,280	Sept. 6	do	.60	31
Mar. 6	do	1.10	845	11	do	.60	38
8	do	1.10	850	13	do	.60	37
15	do	1.10	510				

Daily discharge, in second-feet, of Santa Ynez River near Lompoc, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	29	29	85	80	1,080	1,550	365	325	165	88	59	37
2	28	29	70	78	6,100	1,650	365	400	155	90	57	36
3	27	29	50	77	4,880	1,350	335	367	150	92	55	35
4	26	30	50	75	2,170	1,050	355	460	153	94	52	34
5	25	30	70	75	1,080	950	310	1,720	157	96	49	33
6	25	30	50	75	837	845	310	860	160	92	46	31
7	25	31	49	74	837	848	310	830	164	88	44	32
8	26	32	55	74	2,950	850	335	620	160	84	45	34
9	26	33	62	73	32,500	800	305	530	156	80	46	35
10	26	33	69	73	20,200	1,050	305	510	152	77	46	37
11	25	33	76	73	15,500	850	305	433	148	81	46	38
12	24	33	83	73	9,200	800	305	425	143	85	46	38
13	24	32	83	72	5,700	600	298	415	135	84	46	37
14	25	32	83	72	3,100	550	290	365	126	83	46	37
15	26	32	85	71	1,590	510	282	325	126	81	46	37
16	27	32	85	71	1,500	510	274	315	127	80	46	37
17	28	32	270	74	2,100	510	267	310	127	79	46	37
18	29	32	110	77	2,350	460	262	304	128	77	46	36
19	29	31	165	72	2,000	460	256	295	128	76	46	36
20	29	31	135	67	2,250	460	260	285	129	75	47	36
21	29	30	111	68	1,900	460	265	275	129	73	47	36
22	28	30	90	70	1,280	460	250	265	124	72	47	36
23	28	30	80	72	1,500	410	260	255	118	71	47	36
24	27	30	85	74	3,450	410	290	245	113	69	45	36
25	27	30	70	76	2,200	410	275	235	107	68	44	35
26	27	29	55	76	1,700	410	264	225	102	67	43	35
27	27	29	80	76	1,600	410	265	215	96	65	42	35
28	27	28	85	160	1,300	410	265	205	91	64	41	35
29	28	28	84	1,760	.....	522	265	195	85	63	40	35
30	28	28	82	5,300	.....	460	320	185	86	61	39	35
31	28	.....	81	1,480	.....	365	.....	175	.....	60	38	.....

Digitized by Google

Monthly discharge of Santa Ynez River near Lompoc, Cal., for the year ending Sept. 30, 1915.

[Drainage area, 725 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	29	24	26.9	0.037	0.04	1,650	C.
November	33	28	30.6	.042	.05	1,820	C.
December	270	49	86.7	.120	.14	5,330	C.
January	5,300	67	345	.476	.55	21,200	C.
February	32,500	837	4,740	6.54	6.81	263,000	D.
March	1,650	365	690	.952	1.10	42,400	C.
April	365	250	293	.404	.45	17,400	C.
May	1,720	175	405	.559	.64	24,900	C.
June	165	85	131	.181	.20	7,800	C.
July	96	60	77.9	.107	.12	4,790	C.
August	59	38	46.2	.064	.07	2,840	C.
September	38	31	35.6	.049	.05	2,120	C.
The year	32,500	24	547	.754	10.22	395,000	

SALINAS RIVER BASIN.

ARROYO SECO NEAR SOLEDAD, CAL.

LOCATION.—In sec. 21, T. 19 S., R. 6 E., at Pettitt's ranch, about 15 miles south of Soledad, Monterey County.

DRAINAGE AREA.—215 square miles.

RECORDS AVAILABLE.—January 1, 1901, to September 30, 1915.

GAGE.—Staff in two sections on right bank; lower section fastened to an alder 400 feet above cable, upper section fastened to sycamore about 100 feet downstream. The lower section was washed out February 9. It was replaced in two sections at same location and datum as previous section. Gage read daily by Mrs. Charles Pettitt; more frequent readings during floods.

DISCHARGE MEASUREMENTS.—Made from cable 400 feet below gage or by wading.

CHANNEL AND CONTROL.—Composed of gravel; fairly permanent except during high water.

EXTREMES OF DISCHARGE.—Maximum stage during year was not recorded as section of gage was washed out February 9. A reading of 12.2 feet was secured in afternoon of that day (discharge, about 7,200 second-feet); minimum stage recorded, 1.95 feet August 31 and September 1 and 7 (discharge, 14 second-feet).

1901–1915: Maximum stage recorded, 20.5 feet January 25, 1914 (discharge, 17,500 second-feet). No flow during periods in 1902 to 1904, 1906, 1908, 1913, and 1914.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Results only fair on account of changes in channel. Discharge February 9 to 24 estimated from observer's notes, rainfall records, and discharge measurement.

Digitized by Google

Discharge measurements of Arroyo Seco near Soledad, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 30	Charles Pettitt.....	7.60	2,030	Apr. 8	Charles Pettitt.....	3.90	337
Feb. 24	Leidl and Pettitt.....	5.85	1,400	19	.....do.....	3.45	233
25	Charles Leidl.....	5.60	1,180	June 6	.....do.....	3.05	160
25	.....do.....	5.57	1,080	July 8	.....do.....	2.60	65
Mar. 26	Charles Pettitt.....	3.52	221	Aug. 15	.....do.....	2.16	26
29	.....do.....	5.15	932				

Daily discharge, in second-feet, of Arroyo Seco near Soledad, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	9.5	15	21	162	1,440	895	535	250	180	74	32	14
2.....	10	16	22	148	4,180	840	535	238	170	74	32	16
3.....	10	15	25	141	1,800	785	512	238	170	74	32	16
4.....	10	15	46	222	1,510	730	432	950	170	67	28	16
5.....	10	15	76	180	960	630	414	730	150	67	28	16
6.....	10	14	60	222	760	630	380	490	140	67	28	16
7.....	10	14	50	204	648	580	380	432	131	67	28	14
8.....	10	13	37	302	4,380	535	364	397	122	67	28	16
9.....	10	13	28	356	5,500	490	364	380	122	67	24	16
10.....	10	13	54	273	2,500	490	348	364	113	67	24	16
11.....	10	13	108	227	1,500	490	333	348	113	61	24	16
12.....	10	13	122	340	800	470	304	333	113	61	24	16
13.....	11	13	96	324	600	470	276	318	113	61	24	18
14.....	11	13	60	324	550	470	263	290	113	55	24	21
15.....	11	13	48	304	500	450	263	276	104	55	24	21
16.....	10	13	28	296	500	450	250	263	104	55	24	18
17.....	11	13	379	234	4,000	432	238	263	104	50	21	18
18.....	15	13	760	229	2,500	414	238	263	96	50	21	18
19.....	15	13	388	200	1,000	380	226	263	96	50	21	21
20.....	15	13	340	182	1,500	364	214	250	96	45	21	21
21.....	15	13	283	190	1,000	348	263	250	88	45	21	21
22.....	15	13	200	186	800	333	226	238	88	45	21	21
23.....	14	13	190	178	700	333	214	238	88	40	18	21
24.....	14	13	180	171	1,400	290	214	226	81	40	18	21
25.....	14	13	180	296	1,180	263	202	226	81	36	16	24
26.....	13	13	162	68	1,060	238	238	214	81	36	16	24
27.....	13	13	162	58	950	238	238	214	81	36	16	24
28.....	13	13	162	670	895	2,110	276	202	81	36	16	24
29.....	12	13	162	1,580	.....	950	250	191	74	36	16	28
30.....	12	13	158	2,770	.....	680	238	191	74	36	16	28
31.....	12	.....	158	1,020	.....	730	.....	185	.....	32	14	.....

NOTE.—Discharge determined as follows: Oct. 1 to Dec. 17, from a well-defined rating curve, but its applicability to this period has not been established by measurements; Dec. 18 to Feb. 8, from a fairly reliable rating curve; Feb. 9–23, estimated from rainfall and observer's notes; Feb. 24, from discharge measurement; Feb. 25 to Sept. 30, from a rating curve fairly well defined between 15 and 2,000 second-feet

Digitized by Google

Monthly discharge of Arroyo Seco near Soledad, Cal., for the year ending Sept. 30, 1915.

[Drainage area, 215 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	15	9.5	11.8	0.055	0.06	726	C.
November	16	13	13.4	.062	.07	797	C.
December	760	21	153	.712	.82	9,410	D.
January	2,770	58	389	1.81	2.09	23,900	D.
February	5,500	500	1,610	7.49	7.80	89,400	D.
March	2,110	238	565	2.63	3.03	34,700	C.
April	535	202	308	1.43	1.60	18,300	C.
May	950	185	313	1.46	1.68	19,200	C.
June	180	74	111	.516	.58	6,600	C.
July	74	32	53.3	.248	.29	3,280	C.
August	32	14	22.6	.105	.12	1,390	C.
September	28	14	19.3	.090	.10	1,150	C.
The year	5,500	9.5	289	1.34	18.24	209,000	

ALAMEDA CREEK BASIN.

ALAMEDA CREEK AT SUNOLGLEN, CAL.

LOCATION.—In the SE. ¼ sec. 7, T. 4 S., R. 1 E., at Sunol dam, about 1 mile below junction with Arroyo de la Laguna, and 1 mile west of Sunolglen, Alameda County.

DRAINAGE AREA.—620 square miles (measured by Spring Valley Water Co.).

RECORDS AVAILABLE.—October 4, 1900, to September 30, 1915.

GAGE.—Gurley electric water-stage recorder on upstream face of dam on left bank. Previous to 1914 a staff gage on upstream side of dam on right bank was used.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge about 400 feet above dam. Heavy weights and stay line are used for high-water measurements to insure correct position of current meter.

CHANNEL AND CONTROL.—The concrete dam acts as a control for the station. Channel above and below dam is composed of gravel and boulders and shifts during high water.

EXTREMES OF DISCHARGE.—1901–1915: Maximum mean daily discharge, 14,700 second feet March 7, 1911; minimum, no flow for a part of nearly every year.

DIVERSIONS.—See Spring Valley aqueduct near Sunolglen.

REGULATION.—None.

ACCURACY.—The dam has been rated in accordance with the cooperative agreement between the Spring Valley Water Co. and the City of San Francisco. Current-meter measurements have been secured by both parties and a rating curve developed, which has been accepted by both.

COOPERATION.—Records showing million gallons per day were furnished by the Spring Valley Water Co. through F. C. Herrmann, chief engineer, and G. A. Elliott, engineer. Daily discharge converted into second-feet and monthly discharge computed by the United States Geological Survey.

Digitized by Google

Daily discharge, in second-feet, of Alameda Creek at Sunolglen, Cal., for the year ending Sept. 30, 1915.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	.....	0.0	3,140	750	350	83	105	14	0.2
2	.....	.0	6,680	608	282	83	95	14	.2
3	.....	.0	5,150	518	246	87	82	7.0	.2
4	.....	44.0	2,340	456	210	198	75	7.0	.2
5	.....	63	1,340	390	187	846	62	7.0	.2
6	.....	101	870	347	170	487	55	7.0	.2
7	.....	159	724	317	165	336	48	7.0	.2
8	.....	387	3,800	291	142	257	42	7.0	.2
9	.....	427	5,580	265	165	227	27	7.0	.2
10	.....	191	4,120	243	149	294	29	7.0	.2
11	.....	149	2,340	231	134	644	29	7.0	.2
12	41	599	1,720	221	134	864	29	6.0	.2
13	16	330	1,190	214	129	594	27	5.0	.3
14	.0	681	708	193	119	459	23	4.0	.3
15	.0	420	565	171	100	344	18	2.9	.2
16	.0	267	515	158	95	289	17	2.5	.2
17	21	184	1,610	146	76	531	17	.6	.....
18	152	112	1,250	134	58	939	17	.6	.....
19	126	77	692	125	55	674	17	.6	.....
20	77	58	1,310	123	55	459	14	.5	.....
21	27	53	1,010	119	58	378	14	.5	.....
22	7.0	41	1,430	108	72	320	14	.5	.....
23	4.6	33	1,310	100	75	285	14	.3	.....
24	2.6	33	1,440	100	78	257	14	.3	.....
25	1.9	58	1,260	100	78	221	14	.3	.....
26	1.9	71	904	100	78	182	13	.3	.....
27	2.3	58	752	123	78	165	11	.2	.....
28	2.6	147	1,190	256	78	139	11	.2	.....
29	4.6	1,940	.....	356	78	134	9.0	.2	.....
30	2.6	2,830	.....	235	78	124	9.0	.2	.....
31	.0	3,010	.....	374	.....	110	.....	.2	.....

NOTE.—No flow Oct. 1 to Dec. 11 and Aug. 17 to Sept. 30.

Monthly discharge of Alameda Creek at Sunolglen, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	0.0	0.0	0.0	0
November	.0	.0	.0	0
December	152	.0	15.8	972
January	3,010	.0	404	24,800
February	6,680	515	1,960	109,000
March	750	100	254	15,600
April	350	55	126	7,500
May	939	83	355	21,800
June	105	9.0	31.7	1,890
July	14	.2	3.77	232
August	.3	.0	.11	7
September	.0	.0	.0	0
The year	6,680	.0	251	182,000

NOTE.—Monthly and yearly discharge computed by engineers of the U. S. Geological Survey.

Digitized by Google

SPRING VALLEY WATER CO.'S AQUEDUCT NEAR SUNOLGLEN, CAL.

LOCATION.—In sec. 12, T. 4 S., R. 1 W., at Brightside weir, about 2½ miles west of Sunolglen, Alameda County.

RECORDS AVAILABLE.—April 6, 1903, to September 30, 1915.

GAGE.—Spring Valley water-stage recorder in pool above the weirs.

DISCHARGE.—Computed from gage-height record showing head over four rectangular weirs. The weirs are made of bronze and have a 30-inch crest.

EXTREMES OF DISCHARGE.—1903–1915: Maximum mean daily discharge reported, 47 second-feet March 21, 1914; minimum discharge, 0.9 second-foot March 25 to 30, 1907.

ACCURACY.—The weirs were very carefully installed and much care is exercised in their maintenance. There is no velocity of approach.

COOPERATION.—Records showing million gallons per day were furnished by the Spring Valley Water Co. through F. C. Herrman, chief engineer, and G. A. Elliott, engineer. Daily discharge converted into second-feet and monthly discharge computed by the United States Geological Survey.

Daily discharge, in second-feet, of Spring Valley Water Co.'s aqueduct near Sunolglen Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	26	23	23	34	37	35	34	35	37	33	33	33
2	23	22	23	33	37	35	34	34	37	34	33	34
3	25	22	23	34	36	34	35	36	35	36	33	34
4	25	22	23	36	34	34	35	38	37	36	33	33
5	26	22	23	34	34	34	34	36	38	37	33	34
6	26	22	24	34	34	36	36	35	38	37	33	32
7	25	22	24	34	35	35	37	36	39	36	34	34
8	25	22	13.6	35	37	35	36	36	38	36	33	31
9	25	16.2	24	34	36	35	36	36	38	35	27	32
10	25	16.7	24	34	36	37	34	36	38	35	27	32
11	24	16.9	27	35	35	36	35	36	37	35	27	32
12	24	16.7	34	35	36	36	36	36	38	35	26	32
13	25	16.7	35	35	36	36	36	36	40	35	26	31
14	25	16.7	34	35	35	36	35	36	40	35	27	31
15	25	16.7	34	35	35	36	35	35	41	34	30	31
16	23	16.7	32	35	36	37	34	36	41	34	34	31
17	23	16.9	34	35	35	37	37	38	41	35	35	34
18	24	16.7	35	35	35	37	38	39	41	35	33	33
19	25	16.4	35	35	35	36	39	38	36	34	34	33
20	25	16.7	35	34	35	37	39	37	36	37	34	32
21	25	21	35	34	35	36	40	35	36	36	34	32
22	25	23	35	34	35	36	37	35	35	34	34	32
23	25	23	35	36	35	34	36	37	36	35	34	32
24	25	23	35	36	35	32	37	36	36	35	34	32
25	25	23	35	36	35	34	37	36	36	34	34	32
26	24	24	34	36	35	34	37	40	36	33	34	32
27	22	21	35	37	35	35	37	40	37	34	34	31
28	22	23	35	36	35	35	36	40	35	33	33	32
29	22	23	34	31	.....	35	35	39	34	34	32	30
30	21	23	35	36	.....	35	35	39	32	34	32	30
31	22	.....	35	37	.....	36	.....	38	.....	33	31	.....

Digitized by Google

Monthly discharge of Spring Valley Water Co.'s aqueduct near Sunolglen, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	26	21	24.3	1,490
November	24	16.2	20.1	1,200
December	35	13.6	30.4	1,870
January	37	31	34.8	2,140
February	37	34	35.3	1,960
March	37	32	35.4	2,180
April	40	34	36.1	2,150
May	40	34	36.8	2,260
June	41	32	37.3	2,220
July	37	33	34.8	2,140
August	35	26	32.0	1,970
September	34	30	32.1	1,910
The year	41	13.6	32.4	23,500

NOTE.—Monthly and yearly discharge computed by engineers of the U. S. Geological Survey.

KERN RIVER BASIN.

KERN RIVER NEAR KERNVILLE, CAL.

LOCATION.—In sec. 14, T. 23 S., R. 32 E., in Tulare County, at base of Fairview Mountain, in Kern National Forest, 3 miles above Salmon Creek, and about 15 miles north of Kernville, Kern County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 1, 1912, to September 30, 1915.

GAGE.—Friez water-stage recorder on left bank about 1 mile above mouth of Tobias Creek. Original gage was vertical staff in three sections fastened to overhanging willow tree on left bank about 160 feet upstream from recorder. From April 1 to September 14, 1913, readings were taken from a temporary staff gage in two sections located a quarter mile upstream. The readings were reduced to the original gage by a relation curve. The first gage was replaced March 17, 1914, by a vertical staff in two sections, 7 feet downstream from the original one, on the same bank and at the same datum. The recorder was installed September 15, 1913, in the same pool and at the same datum.

DISCHARGE MEASUREMENTS.—Made from car and cable about 90 feet below recorder or by wading.

CHANNEL AND CONTROL.—Coarse gravel and boulders; apparently permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 4.94 feet at 7 a. m. June 9 (discharge, 4,090 second-feet); minimum stage from water-stage recorder, −0.43 foot from 2 to 4 p. m. February 3 (discharge, 194 second-feet).

1912–1915: Maximum stage recorded, 4.94 feet from water-stage recorder at 7 a. m. June 9, 1915 (discharge, 4,090 second-feet); minimum stage recorded, −0.75 foot January 6, 1913 (discharge, 142 second-feet).

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Results excellent.

Digitized by Google

Discharge measurements of Kern River near Kernville, Cal., during the year ending Sept. 30, 1915.

[Made by H. J. Tompkins.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 7	0.20	328	June 15	3.60	2,670
June 13	3.50	2,560			

Daily discharge, in second-feet, of Kern River near Kernville, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	407	285	245	262	278	340	652	830	3,440	2,040	488	308
2	391	288	238	262	312	322	750	830	3,330	1,990	470	308
3	373	285	278	262	222	318	802	775	2,900	2,040	470	320
4	364	282	278	278	242	325	830	830	2,500	1,940	470	315
5	358	278	252	260	282	338	802	860	2,360	1,770	452	300
6	352	275	240	275	310	340	725	830	2,600	1,400	452	282
7	343	270	232	258	302	340	725	920	3,000	1,210	435	272
8	338	265	226	268	302	338	775	920	3,440	1,210	432	265
9	335	265	236	268	340	328	775	890	3,680	1,360	414	260
10	325	265	252	265	343	327	830	1,010	3,560	1,440	407	265
11	315	265	250	280	340	322	890	1,080	3,330	1,520	400	312
12	315	265	262	282	302	338	1,010	1,210	2,700	1,480	391	282
13	310	265	250	272	308	349	1,110	1,320	2,360	1,360	382	265
14	308	262	268	308	315	391	950	1,240	2,310	1,210	373	265
15	302	262	295	288	325	470	860	1,320	2,450	1,080	370	265
16	302	260	285	268	376	545	830	1,520	2,500	980	364	258
17	300	258	288	265	397	585	860	1,900	2,500	950	355	245
18	290	248	275	305	394	585	1,040	1,730	2,600	890	346	240
19	290	240	270	300	349	630	1,210	1,520	2,310	860	340	238
20	290	240	282	295	340	652	1,360	1,360	2,170	830	332	234
21	292	240	270	295	312	700	1,360	1,360	2,260	830	322	228
22	308	250	275	295	310	750	1,180	1,400	2,310	950	315	224
23	305	252	288	268	322	830	1,110	1,480	2,310	1,010	315	224
24	295	250	285	262	320	860	1,040	1,560	2,310	1,010	318	224
25	290	248	280	285	312	890	1,010	1,520	2,260	920	315	236
26	290	245	275	252	312	775	1,010	1,560	1,990	830	308	240
27	292	245	265	285	318	675	920	1,940	1,990	725	300	240
28	292	252	255	292	325	700	890	2,360	2,040	652	295	232
29	295	250	262	270	.....	750	950	2,260	2,040	585	288	226
30	312	222	252	270	.....	675	890	2,400	1,990	545	288	224
31	305	.....	255	260	.....	608	.....	2,800	.....	505	305	.....

NOTE.—Discharge determined from a well-defined rating curve. Recorder not working properly January 24–28 and June 27–29; discharge estimated from sketched-in gage-height graph.

Monthly discharge of Kern River near Kernville, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	407	290	319	19,600	A.
November	288	222	259	15,400	B.
December	295	226	263	16,200	B.
January	308	252	276	17,000	B.
February	397	222	318	17,700	A.
March	890	318	529	32,500	A.
April	1,360	652	938	55,800	A.
May	2,800	775	1,400	86,100	A.
June	3,680	1,990	2,580	154,000	A.
July	2,040	505	1,170	71,900	A.
August	488	288	371	22,800	A.
September	320	224	260	15,500	B.
The year	3,680	222	724	524,000	

Digitized by Google

KERN RIVER NEAR BAKERSFIELD, CAL.[1]

LOCATION.—In sec. 2, T. 29 S., R. 28 E., at mouth of lower canyon, 5 miles northeast of Bakersfield, Kern County.

DRAINAGE AREA.—2,345 square miles.

RECORDS AVAILABLE.—January 1, 1894, to June 30, 1907, and March 1, 1908, to September 30, 1915.

GAGE.—Water-stage recorder at footbridge.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Sand and shifting.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 6.16 feet at 1.55 p. m. June 10 (discharge, 4,249 second-feet); minimum discharge, 225 second-feet September 24.

1896–1915: Maximum stage recorded January 26, 1914 (discharge, 18,300 second-feet); minimum stage recorded September 15, 1898 (discharge, 80 second-feet).

DIVERSIONS.—Several small diversions on main river and South Fork for irrigation. Water diverted at and below Kernville for power development is returned to the river above the station.

REGULATION.—No information.

ACCURACY.—Results good.

COOPERATION.—Complete record furnished by Kern County Land Co. through A. K. Warren, engineer.

The following discharge measurement was made by H. J. Tompkins:
October 11, 1914: Gage height, 3.97 feet; discharge, 386 second-feet.

Daily discharge, in second-feet, of Kern River near Bakersfield, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	511	354	307	347	509	510	943	1,621	3,570	2,082	588	298
2	486	371	294	344	460	551	989	1,556	3,967	2,095	544	313
3	458	370	311	341	537	538	1,109	1,489	3,698	2,029	532	308
4	446	361	323	352	533	520	1,230	1,468	3,284	2,042	518	304
5	438	369	355	355	440	522	1,280	1,616	3,008	1,954	517	320
6	431	361	339	364	452	542	1,245	1,595	2,998	1,693	506	315
7	429	361	322	368	501	551	1,111	1,639	3,165	1,447	491	302
8	418	360	295	367	520	556	1,083	1,707	3,491	1,272	489	291
9	393	355	294	363	541	552	1,079	1,705	3,873	1,283	479	284
10	424	366	304	365	613	547	1,078	1,699	4,010	1,384	455	275
11	422	375	324	347	618	535	1,164	1,739	3,862	1,452	437	288
12	417	364	343	348	608	532	1,320	1,799	3,540	1,502	422	326
13	396	352	325	346	564	542	1,475	1,986	2,997	1,481	412	317
14	377	355	327	352	486	574	1,543	2,062	2,751	1,386	401	297
15	374	357	317	364	507	623	1,382	1,950	2,675	1,273	386	293
16	375	359	334	376	511	689	1,284	1,952	2,761	1,144	382	295
17	368	351	359	356	615	825	1,224	2,174	2,761	1,075	371	282
18	368	347	379	341	684	906	1,270	2,789	2,678	1,103	364	272
19	369	340	396	347	656	948	1,486	2,559	2,666	1,022	352	260
20	367	328	379	365	623	995	1,698	2,278	2,362	953	327	255
21	371	312	381	377	604	1,011	1,860	2,064	2,311	966	311	248
22	378	309	369	388	570	1,048	1,867	2,002	2,395	923	310	243
23	387	307	373	383	515	1,102	1,702	2,016	2,415	981	326	236
24	385	316	380	372	534	1,170	1,560	2,086	2,362	1,012	322	228
25	370	312	390	369	536	1,209	1,463	2,088	2,382	984	329	234
26	366	314	394	385	524	1,220	1,454	2,049	2,341	936	324	240
27	364	301	391	371	504	1,104	1,432	2,105	2,099	824	311	250
28	358	313	397	374	489	992	1,418	2,466	2,144	804	316	245
29	359	318	378	341	.....	1,029	1,431	2,717	2,183	711	314	243
30	366	324	364	433	.....	1,055	1,616	2,745	2,130	647	307	239
31	359	.....	359	443	.....	972	.....	3,055	.....	610	295	.....

[1] Station also known as at "first point of measurement."

Digitized by Google

Monthly discharge of Kern River near Bakersfield, Cal. for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	518	328	398	24,500
November	383	298	343	20,400
December	407	285	348	21,400
January	458	279	366	22,500
February	710	425	545	30,300
March	1,283	470	789	48,500
April	1,907	920	1,360	80,900
May	3,440	1,437	2,025	124,500
June	4,249	1,991	2,896	172,300
July	2,228	594	1,260	77,500
August	605	284	401	24,700
September	337	225	277	16,500
The year	4,249	225	917	664,000

NOTE.—Maximum and minimum monthly and yearly discharge are absolute extremes of discharge determined from the water-stage recorder. Run-off in acre-feet computed by U. S. Geological Survey.

ERSKINE CREEK NEAR BODFISH, CAL.[1]

LOCATION.—In the SW. ¼ SW. ¼ sec. 24, T. 27 S., R. 33 E., 700 feet west of Otto Liebel's residence, about 6 miles southeast of Bodfish, Kern County, and 8 miles southeast of Isabella. Previous to March 28, 1913, this station was located at about 4 miles downstream in the NW. ¼ sec. 9, T. 27 S., R. 33 E., at ford at mouth of canyon, 2¼ miles above junction with Kern River, 3 miles east of Bodfish, and 5 miles south of Isabella.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 7, 1911, to September 30, 1915 (fragmentary).

GAGE.—Vertical staff on left bank; read occasionally by Otto Liebel. Gage at old location was vertical staff on left bank fastened to willow tree, about 80 feet above ford.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Sand and gravel.

EXTREMES OF STAGE.—Maximum stage recorded during year, 1.92 feet May 1 and 7; minimum stage recorded, 1.30 feet July 31 and August 7, 14, 21, and 28.

1912–1915: Maximum stage recorded, 3.85 feet January 25, 1914; minimum stage recorded, 1.2 feet during the low water of 1912 and 1913.

DIVERSIONS.—A small ditch diverts water for irrigation about 5 miles upstream.

REGULATION.—No information.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Data inadequate for estimates of discharge.

No discharge measurements were made at this station during the year.

[1] Known formerly as "near Isabella."

Digitized by Google

Daily gage-height, in feet, of Erskine Creek near Bodfish, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1								1.92				
2				1.75								
3	1.38						1.85			1.42		
4												1.32
5			1.60						1.72			
6		1.45			1.80	1.80						
7								1.92			1.30	
8												
9				1.78								
10	1.38						1.88			1.38		
11									1.68			1.32
12			1.68									
13		1.48			1.80	1.80						
14											1.30	
15												
16				1.78								
17	1.40						1.90			1.35		
18												1.35
19			1.70						1.52			
20					1.80	1.80						
21		1.50	1.75								1.30	
22								1.88				
23				1.78								
24	1.42						1.88			1.35		
25												1.35
26			1.78						1.48			
27					1.80	1.82						
28		1.55						1.80			1.30	
29												
30				1.80								
31	1.42									1.30		

TULARE LAKE BASIN.

TULARE LAKE IN KINGS COUNTY, CAL.

LOCATION.—At quarter corner between secs. 8 and 17, T. 21 S., R. 20 E., at headgate at corner of north-south and east-west levies on G. Albert Smith ranch, about 5 miles southwest of Stratford.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 15, 1906, to September 30, 1915 (incomplete). All published records give actual depth of water on the lowest point of the lake bed.

GAGE.—Vertical staff in two sections fastened to the headgate. It is read about once a week by Mrs. E. G. Kolbenstetter. Gage readings reduced to depth of water from the following data: Elevation of bottom of lake, 179.1 feet above mean sea level; elevation of zero of gage, 176.4 feet.

During 1906 and a part of 1907 the readings were made from a gage near the entrance of Kings River near Lemoore, at the middle of sec. 4, T. 21 S., R. 20 E. The zero of that gage was at 175.1 feet elevation. May 11, 1907, a staff gage was set near Corcoran, with its datum at the same elevation, and was used until July 30, 1909. July 28, 1910, a vertical staff was installed on the section line just south of the corner to secs. 27, 28, 33, and 34, T. 20 S., R. 20 E., about 10 miles south of Lemoore, near Stratford post office. The elevation of the zero of this gage was 171.0 feet. On August 20, 1913, a vertical staff in four sections was installed in main north and south waterway, 4 to 6 miles southeast of Startford. Its zero was also at elevation 171.0 feet. Sections No. 1 and No. 2 were 1 mile south of 1910 gage in sec. 3, T. 21 S., R. 20 E. No. 3 was in sec. 10 and No. 4 was was in sec. 15, 1 and 2 miles, respectively, south of sections No. 1 and No. 2

Digitized by Google

The present gage was installed May 15, 1914, on account of the rebuilding of the levees.

EXTREMES OF STAGE.—Maximum depth recorded during year, 3.8 feet June 20; minimum depth recorded, −0.65 feet December 18. Negative depths show all water in the channels and below the bottom of the lake.

1906–1915: Maximum depth, 14.0 feet June 21, 1907; the lake was empty for a period in 1906 and from the later part of October to the later part of December, 1914.

The lake is roughly rectangular in shape and its greatest length is from northwest to southeast. In November, 1907, when its margin was carefully determined, the lake had an area of about 274 square miles, a maximum depth of 12.4 feet, an average length of 20 miles, and a width of 13.5 miles; the water's edge was 3 miles from the town of Corcoran, and the water surface about 12 feet below.

The lake bed resembles a flat saucer. The flat, level area in the bottom is approximately 180 feet above mean sea level and covers about 55 square miles. The lowest point on the crest of the delta ridge to the north is about 27 feet higher than the bottom of the lake. Natural outflow will not occur, therefore, until the lake has a maximum depth of nearly 30 feet and an area of nearly 1,000 square miles.

Depth, in feet, of Tulare Lake in Kings County, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1											2.6	
2												
3					0.45							
4	0.95						0.95					
5												
6												
7			−0.55									
8												
9								1.05				
10												
11							.65			3.15		
12	.75											1.3
13									3.6			
14												
15												
16											1.9	
17				0.55								
18	.25		−.65			1.05						
19												
20							.45		3.8	3.0		1.2
21												
22		−0.35										
23								1.8				
24						1.05						
25							.25					
26	−.05			.45								1.05
27												
28												
29		−.45									1.6	
30								1.9	3.4			
31			+.65									

NOTE.—Negative depths show all water in channels and below bottom of lake.

DEER CREEK AT HOT SPRINGS, CAL.

LOCATION.—Below footbridge at forest supervisor's headquarters in Sequoia National Forest, about half a mile below Hot Springs, Tulare County. Tyler Creek enters about 2½ miles below the station.

Digitized by Google

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 7, 1910, to September 30, 1915.

GAGE.—Vertical staff fastened to an alder tree on left bank 30 feet downstream from footbridge; read once a day by A. B. Patterson.

DISCHARGE MEASUREMENTS.—Made from highway bridge 100 feet below gage or by wading.

CHANNEL AND CONTROL.—Sand, gravel. and boulders.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.75 feet at 5 p. m. May 4 (discharge, 81 second-feet); minimum stage recorded, 0.31 foot at 3.30 p. m. October 1 (discharge, 1.3 second-feet).

1910–1915: Maximum stage recorded, 2.9 feet at 10 a. m. January 24, 1914 (discharge, about 230 second-feet, determined from extension of rating curve); minimum stage recorded, 0.24 foot August 14 to 16, 1913 (discharge, 0.8 second-foot).

DIVERSIONS.—Water is diverted for irrigation above the station.

REGULATION.—No information.

ACCURACY.—Results for high stages subject to error, and fair for medium and low stages. No discharge measurements were made at this station during the years ending September 30, 1914 and 1915. A measurement made in 1916 was used to help define the curve.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Daily discharge, in second-feet, of Deer Creek at Hot Springs, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.3	4.0	4.0	6.8	9.8	12	13	32	42	16	5.8	a2.5
2	2.5	4.0	4.4	a6.7	18	a12	14	a36	42	14	5.6	2.5
3	2.5	4.4	5.4	a6.5	a14	12	14	39	42	14	5.1	2.5
4	2.9	a4.0	6.3	a6.3	a12	12	14	56	39	14	3.4	2.5
5	2.9	a3.7	a5.6	6.1	9.8	11	17	50	a38	14	4.4	a2.5
6	2.5	3.4	4.9	6.6	8.3	9.8	14	42	36	13	4.0	2.5
7	2.2	a3.4	4.4	6.3	8.0	9.8	14	42	a35	10	2.7	2.5
8	2.2	3.4	4.4	6.3	8.0	9.8	14	46	34	10	a2.8	2.5
9	2.2	a3.7	4.4	6.3	14	9.8	13	42	33	10	2.9	a2.5
10	2.5	4.0	5.8	6.3	13	9.8	14	42	33	10	a2.9	2.5
11	2.5	4.0	7.4	6.3	16	9.8	14	42	25	10	2.9	4.4
12	2.5	4.0	6.8	6.8	11	9.8	14	39	24	10	a3.1	3.4
13	2.5	4.0	6.8	a6.8	9.8	9.8	17	36	24	9.8	a3.2	2.9
14	2.2	4.0	5.6	17	9.8	9.8	14	a37	a23	9.2	3.4	a3.2
15	2.2	4.0	5.8	6.3	9.2	9.8	13	a38	22	8.3	a3.6	3.4
16	2.2	4.0	5.6	5.8	17	11	13	39	23	7.4	3.8	a3.2
17	2.2	4.0	6.8	a5.4	16	11	13	76	a20	7.4	a3.7	3.1
18	a2.4	3.6	6.8	4.9	13	13	16	66	18	7.4	a3.6	2.9
19	2.5	3.4	6.8	4.9	14	13	15	58	a18	a7.1	a3.5	2.5
20	2.5	3.4	6.8	4.9	12	13	16	54	a17	a6.8	a3.4	2.5
21	6.3	3.4	6.8	5.1	13	13	18	a51	17	a6.5	a3.3	2.5
22	4.0	3.4	6.8	5.1	11	14	32	a48	a17	a6.2	a3.2	a2.5
23	a3.7	3.4	6.8	5.1	11	16	23	46	a16	a5.8	a3.1	2.5
24	3.4	3.4	6.8	6.3	12	17	20	a44	a15	a5.5	a3.0	a2.5
25	3.4	3.4	6.8	6.3	11	16	18	42	a14	a5.2	a2.9	a2.5
26	2.5	3.4	6.8	6.3	11	14	19	42	14	4.9	a2.8	a2.5
27	2.5	3.4	6.8	6.3	11	13	20	a42	14	a5.0	a2.7	a2.5
28	2.5	3.6	6.8	6.8	13	25	22	42	15	a5.0	a2.6	a2.5
29	3.4	4.0	6.8	9.8	.....	a31	50	46	15	a5.0	2.5	a2.5
30	4.0	4.0	6.8	12	.....	14	42	a44	14	5.1	2.5	a2.5
31	4.0	.....	6.8	10	.....	13	.....	42	.....	5.8	2.5	.....

a Estimated by comparison with record of flow of South Fork of Tule River near Portersville; gage not read.

NOTE.—Discharge determined from a rating curve fairly well defined between 5 and 50 second-feet.

Digitized by Google

Monthly discharge of Deer Creek at Hot Springs, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	6.3	1.3	2.81	173	D.
November	4.4	3.4	3.73	222	D.
December	7.4	4.0	6.12	376	C.
January	17	4.9	6.85	421	C.
February	18	8.0	12.0	666	C.
March	31	9.8	13.0	799	C.
April	50	13	18.3	1,090	C.
May	76	32	45.2	2,780	C.
June	42	14	24.6	1,460	C.
July	16	4.9	8.66	532	D.
August	5.8	2.5	3.38	208	
September	4.4	2.5	2.72	162	
The year	76	1.3	12.3	8,890	

TULE RIVER NEAR PORTERSVILLE, CAL.

LOCATION.—In the NW. ¼ NW. ¼ sec. 25, T. 21 S., R. 28 E., below highway bridge near McFarland ranch, about 1 mile above mouth of South Fork, and 6 miles east of Portersville, Tulare County. The North and Middle forks of the Tule River unite about 9 miles above the station.

DRAINAGE AREA.—266 square miles.

RECORDS AVAILABLE.—May 1, 1901, to September 30, 1915.

GAGE.—Staff in four sections on right bank 75 feet below bridge; sections Nos. 1, 3, and 4 are vertical; No. 2 is inclined. Original gage was on the same bank 200 feet below bridge and at same datum. There have been several changes in the number and kinds of staff sections, but the same datum has been maintained. Gage read once a day by Mrs. Martha Brough.

DISCHARGE MEASUREMENTS.—Made from bridge above gage or by wading. Bridge measurements are corrected for angle to current.

CHANNEL AND CONTROL.—Gravel and small boulders; shifts slightly during high water. Left bank is low and wooded and subject to overflow above a stage of about 6 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.3 feet at 11 p. m. May 4 (discharge, 1,740 second-feet); minimum stage recorded, 0.60 foot August 20 to September 1 (discharge, 8.0 second-feet).

1901–1915: Maximum stage recorded, 10.8 feet at 12 p. m. January 25, 1914 (discharge, about 6,600 second-feet, computed from extension of rating curve); minimum stage recorded, 0.2 foot August 22, 1913 (discharge, 1 second-foot).

DIVERSIONS.—Several small irrigation ditches divert water above the station.

REGULATION.—Power is developed upon the Middle Fork and upon the North and South forks of the Middle Fork.

ACCURACY.—Results good.

Digitized by Google

Discharge measurements of Tule River near Portersville, Cal., during the year ending Sept. 30, 1915.

[Made by R. C. Rice.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 18	0.73	16
Feb. 1	1.61	108

Daily discharge, in second-feet, of Tule River near Portersville, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	9.2	20	24	48	105	183	173	505	545	113	26	8.0
2	9.2	20	24	48	325	173	224	470	505	105	24	8.6
3	9.2	20	26	48	173	137	224	435	435	98	21	9.2
4	9.2	20	30	105	137	137	203	1,380	370	94	19	9.2
5	9.8	20	30	59	121	129	213	715	370	91	17	9.2
6	10	20	30	71	121	129	193	625	370	88	15	9.2
7	12	20	34	65	113	121	213	470	385	84	14	9.2
8	13	20	38	77	113	121	235	435	385	81	13	11
9	14	20	38	91	355	113	183	470	370	78	13	11
10	14	20	41	88	235	113	235	505	340	77	13	11
11	14	20	55	84	325	113	224	545	310	75	13	11
12	14	20	53	77	183	110	224	545	310	71	13	11
13	14	20	48	77	169	105	310	545	272	65	13	11
14	14	20	43	77	137	113	260	545	260	59	13	11
15	14	20	43	75	121	129	213	505	248	53	12	11
16	14	20	43	72	173	173	193	470	235	48	11	11
17	14	20	43	65	235	203	213	1,100	224	48	10	11
18	16	20	53	59	193	213	235	980	213	43	9.8	11
19	17	20	48	53	155	193	235	920	213	43	9.2	11
20	17	20	47	53	164	224	260	865	213	43	8.0	11
21	17	20	46	51	235	235	285	670	203	34	8.0	11
22	18	20	45	51	173	235	325	585	193	33	8.0	11
23	18	20	43	51	155	248	298	545	173	30	8.0	11
24	19	20	43	51	146	260	260	525	173	27	8.0	11
25	19	20	43	51	146	224	224	505	155	27	8.0	11
26	20	21	43	77	146	224	224	488	155	27	8.0	11
27	20	21	43	53	137	164	203	470	137	27	8.0	11
28	20	22	48	55	121	164	213	505	129	27	8.0	11
29	20	23	48	91	.....	260	355	505	119	27	8.0	11
30	20	24	48	224	.....	224	670	505	118	27	8.0	11
31	20	.....	48	121	.....	173	.....	525	.....	27	8.0	.....

NOTE.—Discharge determined from a fairly well defined rating curve.

Monthly discharge of Tule River near Portersville, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	20	9.2	15.1	928	B.
November	24	20	20.4	1,210	B.
December	55	24	41.6	2,560	B.
January	224	48	73.2	4,500	B.
February	355	105	175	9,720	B.
March	260	105	172	10,600	B.
April	670	173	251	14,900	B.
May	1,380	435	608	37,400	B.
June	545	118	271	16,100	B.
July	113	27	57.1	3,510	B.
August	26	8.0	12.1	744	B.
September	11	8.0	10.5	625	B.
The year	1,380	8.0	142	103,000	

Digitized by Google

BEAR CREEK NEAR SPRINGVILLE, CAL.

LOCATION.—At Bear Creek ranger station, about 150 feet above mouth of Rancheria Creek, 2¾ miles above junction with North Fork of Tule River, and 6 miles northeast of Springville, Tulare County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 23, 1911, to September 30, 1915, (not complete).

GAGE.—Vertical staff fastened to a sycamore tree on right bank about 600 feet southwest of ranger station; read once a day, occasionally, by W. F. Derby.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Sand, gravel, and boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.00 feet at 5 p. m. May 4 (discharge, 87 second-feet); minimum stage recorded, 0.45 foot at 1 p. m. August 13 (discharge, 0.4 second-foot).

1911–1915: Maximum stage recorded, 5.6 feet at 11 p. m. January 25, 1914 (discharge, 295 second-feet); minimum stage recorded, 0.30 foot September 17, 1913 (discharge, 0.1 second-foot.)

DIVERSIONS.—A small irrigation ditch heads about 300 feet above the station.

REGULATION.—None.

ACCURACY.—Results subject to considerable error because of infrequent gage readings.

COOPERATION.—Gage-height record furnished by United States Forest Service.

The following discharge measurement was made by R. C. Rice:
February 1, 1915: Gage height, 1.09 feet; discharge, 5.1 second-feet.

Daily discharge, in second-feet, of Bear Creek near Springville, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	a0.8	1.4	1.5	2.1	a5.2	9.3	a8.6	a39	a19	a4.2	a1.5	0.6
2	.8	1.4	1.6	2.1	a58	a8.6	9.0	a44	19	4.2	1.4	.6
3	.8	a1.4	1.6	2.1	35	a5.1	9.0	44	19	4.2	1.4	.6
4	.8	1.4	a1.7	a4.3	29	4.9	8.6	a87	19	a4.2	1.3	.6
5	a1.0	1.4	1.7	3.0	25	4.7	8.6	60	19	4.0	1.2	.6
6	1.0	1.4	1.7	a2.4	25	4.6	a8.6	48	a19	3.8	1.2	a.6
7	1.0	1.4	1.8	3.5	21	4.5	9.0	44	17	3.6	a1.1	.6
8	1.0	1.4	1.9	a30.0	21	a4.4	8.6	42	15	3.4	.9	.6
9	1.0	1.4	2.0	5.0	a30	4.3	8.6	a39	13	3.2	.8	.6
10	1.0	1.4	a2.1	3.0	a6.8	4.3	a8.6	37	11	3.0	.7	a.6
11	1.0	1.4	2.4	3.0	a7.7	a4.2	8.6	35	9.0	2.8	.6	.6
12	1.0	1.4	2.2	a3.0	6.0	4.1	8.6	33	a8.6	2.6	.5	.6
13	1.0	1.4	2.1	3.0	5.5	4.1	8.6	a34	8.4	2.4	a .4	.6
14	1.0	1.4	2.1	2.9	5.5	4.2	a8.6	33	8.2	a2.3	.4	.6
15	1.0	1.4	2.1	a2.9	5.5	5.6	8.6	32	8.0	2.3	.5	.6
16	a1.0	1.4	2.1	2.9	a5.3	a8.6	8.6	33	a7.9	2.3	.5	.6
17	1.0	1.4	2.1	2.9	10	8.1	8.8	a44	7.5	2.3	.5	.6
18	a1.0	1.4	2.2	2.9	10	7.6	a8.6	50	7.1	a2.3	.6	.6
19	1.0	1.4	2.1	2.9	15	7.2	8.6	45	a6.8	2.2	a.6	.6
20	1.1	1.4	2.1	2.9	a26	a6.8	9.0	40	6.8	2.2	.6	.6
21	a1.2	1.4	2.1	2.9	a6.8	a11	a13	40	6.8	2.1	.6	.6
22	1.2	a1.4	2.1	2.9	6.8	11	20	40	6.8	2.0	a.6	a.6
23	1.2	1.4	a2.1	2.9	6.8	12	a9.7	a39	a6.8	2.0	.6	.6
24	a1.2	1.4	2.1	2.9	a6.8	13	9.7	35	6.4	1.9	.6	.6
25	1.2	1.4	2.1	a3.2	6.8	a6.8	9.7	31	6.0	1.9	.6	.6
26	1.2	1.4	2.1	3.0	6.7	6.8	9.7	27	5.6	1.8	.6	.6
27	1.3	1.4	2.1	3.0	6.6	15	a9.7	a24	a5.3	1.8	.6	.7
28	1.3	a1.4	2.1	4.0	a6.6	a61	9.7	22	4.9	1.7	.6	.8
29	1.4	1.4	2.1	4.3	.....	7.0	a32	20	4.5	1.7	.6	.9
30	a1.5	a1.5	a2.1	a2.4	.....	6.9	44	a19	a4.2	a1.6	.6	a1.0
31	a1.4	.....	2.1	3.8	.....	a6.8	.....	19	.....	1.6	.6	.....

a From gage height reading.

NOTE.—Discharge for days when gage was read determined from a rating curve well defined between 5 and 60 second-feet. Discharge for other days estimated by comparison with records of flow of South Fork of Tule River and Tule River near Portersville and from U. S Weather Bureau rainfall record at Milo and Springville.

Digitized by Google

Monthly discharge of Bear Creek near Springville, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	1.5	0 8	1.08	66
November	1.5	1.4	1.40	83
December	2.4	1.5	2.01	124
January	30	2.1	3.94	242
February	58	5.2	14.5	805
March	61	4.1	8.79	540
April	44	8.6	11.4	678
May	87	19	38.0	2,340
June	19	4.2	10.2	607
July	4.2	1.6	2.63	162
August	1.5	.4	.75	46
September	1.0	.6	.63	37
The year	87	.4	7.91	5,730

SOUTH FORK OF TULE RIVER NEAR PORTERSVILLE,[1] CAL.

LOCATION.—Opposite Indian school on Tule Indian Reservation, 2 miles below the mouth of Rocky Creek, 7 miles southeast of Success, about 8 miles above junction with Tule River, and 14 miles southeast of Portersville, Tulare County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 10, 1910, to September 30, 1915.

GAGE.—Vertical staff fastened to an alder tree on left bank 100 feet above pump house; read once a day by A. P. Edmonson.

DISCHARGE MEASUREMENTS.—Made from car and cable half a mile below gage or by wading.

CHANNEL AND CONTROL.—Rough; composed of boulders and gravel; shifts slightly during high water. Both banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.0 feet at 9 a. m. and 5 p. m. May 18 (discharge, 452 second-feet); minimum stage recorded, 0.3 foot October 1 to 6 (discharge, 2.5 second-feet).

1910–1915: Maximum stage recorded, 8.0 feet at 8. m. January 26 1914 (discharge, about 2,750 second-feet, computed from extension of rating curve based upon discharge measurements made in 1916, the stage of the highest measurement being 3.8 feet); minimum stage recorded, 0.0 foot August 4–16, 18–26; September 11–22; and October 1, 1913 (discharge, 1 second-foot).

DIVERSIONS.—Several small irrigation ditches (total capacity about 12 second-feet) divert water above the station.

REGULATION.—None.

ACCURACY.—Results good. Measurements made since the close of the year have defined the curve up to stage, 4.0 feet.

COOPERATION.—Gage-height record furnished by United States Indian Service.

Discharge measurements of South Fork of Tule River near Portersville, Cal., during the year ending Sept. 30, 1915.

[Made by R. C. Rice.]

Date.	Gage height.	Discharge	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 17	0.40	4.3	Jan. 30	1.18	42

[1] Originally known as "near Success."

Digitized by Google

Daily discharge, in second-feet, of South Fork of Tule River near Portersville, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.5	a 6.8	a 7.8	12	37	64	53	288	163	37	10	4.3
2	2.5	a 6.8	a 8.9	12	91	58	53	232	143	37	10	4.3
3	2.5	a 6.8	10	18	53	53	53	232	143	37	10	4.3
4	2.5	a 6.8	14	18	45	53	53	350	124	37	10	4.3
5	2.5	6.8	a 14	18	37	53	53	318	107	37	10	4.3
6	2.5	6.8	14	18	37	49	53	259	91	37	6.8	4.3
7	4.3	a 6.8	14	18	29	49	76	232	84	37	6.8	4.3
8	4.3	a 6.8	14	18	29	49	58	232	76	37	6.8	4.3
9	4.3	6.8	a 15	18	70	37	53	232	76	29	6.8	4.3
10	4.3	a 6.8	16	23	58	37	53	232	76	23	6.8	4.3
11	4.3	a 6.8	18	23	91	37	53	208	76	23	6.8	4.3
12	4.3	6.8	a 16	23	45	37	53	208	64	23	6.8	4.3
13	4.3	6.8	14	23	45	37	53	185	64	23	6.8	4.3
14	5.6	6.8	a 13	25	45	53	53	185	64	18	6.8	4.3
15	5.6	a 6.8	a 13	23	37	49	53	185	64	18	6.8	4.3
16	5.6	a 6.8	12	23	37	49	53	208	64	18	6.8	4.3
17	4.3	6.8	14	23	37	53	64	232	53	18	6.8	4.3
18	a 5.4	a 6.8	14	18	53	53	53	452	53	18	6.8	4.3
19	a 6.6	a 6.8	14	18	53	53	53	350	53	18	6.8	4.3
20	a 7.7	6.8	a 14	a 18	91	53	64	288	53	18	6.8	4.3
21	a 8.9	6.8	14	a 18	53	53	76	259	53	18	6.8	4.3
22	10	a 6.8	14	a 18	49	53	124	232	53	18	6.8	4.3
23	8.4	6.8	a 14	18	53	53	76	208	45	18	6.8	4.3
24	6.8	a 6.8	a 14	18	53	53	76	208	45	18	6.8	4.3
25	6.8	6.8	14	23	53	53	64	185	45	14	6.8	4.3
26	6.8	a 6.8	14	18	53	53	64	163	45	14	6.8	4.3
27	a 6.6	6.8	12	23	53	53	64	163	45	10	6.8	4.3
28	6.3	a 6.8	12	29	53	64	64	163	45	10	6.8	4.3
29	5.6	a 6.8	a 12	45	.....	91	143	163	37	10	4.3	4.3
30	5.6	6.8	12	53	.....	53	318	163	37	10	4.3	4.3
31	6.8	.....	12	45	.....	53	.....	163	.....	10	4.3	.....

a Interpolated.

NOTE.—Discharge determined from a rating curve well defined below 60 second-feet, and fairly well defined above 60 second-feet.

Monthly discharge of South Fork of Tule River near Portersville, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	10	2.5	5.31	326	B.
November	6.8	6.8	6.80	405	B.
December	18	7.8	13.3	818	B.
January	53	12	23.4	1,440	B.
February	91	29	51.4	2,850	B.
March	91	37	51.9	3,190	B.
April	318	53	72.6	4,320	B.
May	452	163	232	14,300	B.
June	163	37	71.4	4,250	B.
July	37	10	22.4	1,380	B.
August	10	4.3	7.07	435	B.
September	4.3	4.3	4.30	256	B.
The year	452	2.5	46.8	34,000	

Digitized by Google

KAWEAH RIVER NEAR THREE RIVERS, CAL.

LOCATION.—In the SE. ¼ sec. 27, T. 17 S., R. 28 E., to J. O. Carter's ranch, 1¼ miles southwest of Three Rivers, Tulare County. South Fork enters three-fourths mile and North Fork 3 miles above the station.

DRAINAGE AREA.—520 square miles.

RECORDS AVAILABLE.—April 29, 1903, to September 30, 1915.

GAGE.—United States Weather Bureau gage in three sections on left bank a few feet above cable and one-fourth mile back of observer's house. The original gage was installed by the United States Geological Survey at same location and datum. On December 5, 1912, the Weather Bureau gage was installed. For about two years the two gages were read interchangeably, according to varying conditions of repair of each. On October 19, 1914, the Geological Survey repaired the upper section of the Weather Bureau gage and has used this gage since. Gage read twice a day by J. O. Carter.

DISCHARGE MEASUREMENTS.—Made from car and cable at gage or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.6 feet at 5 a. m. June 1 (discharge, 3,600 second-feet); minimum stage recorded, 4.45 feet at 6 p. m. September 24 and 25 (discharge, 42 second-feet).

1903–1915: Maximum stage recorded, 13.0 feet at 10 p. m. January 25, 1914 (discharge, about 13,300 second-feet, computed from extension of rating curve); minimum stage recorded, 4.35 feet August 22, 1914 (discharge, 30 second-feet).

DIVERSIONS.—Several small ditches divert water for local irrigation and domestic use above the station.

REGULATION.—Power is developed on the Middle and East forks but effect is thought to be small.

ACCURACY.—Results good.

Discharge measurements of Kaweah River near Three Rivers, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 19	R. C. Rice	4.60	63
June 10	H. J. Tompkins	7.82	2,540

Digitized by Google

Daily discharge, in second-feet, of Kaweah River near Three Rivers, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	79	67	57	83	239	324	545	1,120	3,280	980	175	63
2	73	79	56	83	490	284	605	980	2,290	938	172	73
3	73	73	56	83	324	260	670	938	1,920	980	160	73
4	73	73	87	136	268	268	740	1,260	1,920	895	145	73
5	73	79	83	115	242	260	740	1,360	1,920	815	154	63
6	73	67	77	105	260	260	605	1,160	2,160	638	142	67
7	73	63	71	101	232	253	605	1,220	2,550	605	139	63
8	73	63	71	105	222	246	605	1,320	2,550	638	133	56
9	73	63	73	110	705	242	705	1,160	2,550	670	125	54
10	67	63	83	105	545	242	705	1,220	2,420	670	115	57
11	63	63	83	105	362	239	855	1,360	2,160	638	115	56
12	63	57	85	105	332	239	1,020	1,580	1,920	605	105	56
13	63	56	83	105	292	232	1,260	2,160	1,690	545	105	60
14	63	56	83	211	276	256	895	1,580	1,690	518	105	60
15	60	59	83	184	268	320	740	1,580	1,690	490	103	63
16	56	57	83	136	358	385	740	1,920	1,690	462	105	57
17	56	54	101	112	545	518	815	2,550	1,690	410	96	60
18	56	52	94	110	410	490	1,070	2,040	1,690	385	94	60
19	63	52	87	110	340	545	1,220	1,920	1,470	362	90	51
20	63	51	85	110	462	605	1,360	1,580	1,470	362	79	48
21	73	48	83	110	362	670	1,260	1,470	1,470	332	79	48
22	105	48	83	110	332	705	1,070	1,470	1,420	362	77	48
23	83	48	83	108	324	778	1,070	1,690	1,360	362	79	47
24	77	48	87	105	300	778	895	1,690	1,360	300	77	45
25	77	48	85	136	304	815	895	1,580	1,260	268	75	45
26	75	48	83	120	300	605	895	1,690	1,160	253	75	48
27	73	48	83	125	276	518	815	2,160	1,160	236	67	56
28	60	51	83	197	284	545	855	2,420	1,120	204	65	54
29	63	56	83	300	.....	705	1,070	2,290	1,070	218	62	60
30	73	56	79	332	.....	545	1,320	2,690	1,070	190	60	51
31	73	.....	83	242	.....	490	.....	3,280	.....	184	63	.....

NOTE.—Discharge determined from a rating curve well defined between 300 and 3,000 second-feet. Discharge Oct. 26, interpolated.

Monthly discharge of Kaweah River near Three Rivers, Cal., for the year ending Sept. 30, 1915.

[Drainage area, 520 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	105	56	69.9	0.135	0.16	4,300	B.
November	79	48	58.2	.112	.12	3,460	B.
December	101	56	80.5	.155	.18	4,950	B.
January	332	83	135	.260	.30	8,300	B.
February	705	222	345	.663	.69	19,200	A.
March	815	232	439	.844	.97	27,000	A.
April	1,360	545	888	1.71	1.91	52,800	A.
May	3,280	938	1,690	3.25	3.75	104,000	A.
June	3,280	1,070	1,770	3.40	3.79	105,000	A.
July	980	184	500	.962	1.11	30,700	A.
August	175	60	104	.200	.23	6,400	B.
September	73	45	57.2	.110	.12	3,400	B.
The year	3,280	45	511	.983	13.33	370,000	

Digitized by Google

NORTH FORK OF KAWEAH RIVER AT KAWEAH, CAL.

LOCATION.—In the SW. ¼ sec. 2, T. 17 S., R. 28 E., at highway bridge in Sequoia National Forest, about one-half mile north of Kaweah, Tulare County, and 2 miles above junction with Kaweah River. Manikin Creek enters one-fourth mile below and Sheep Creek 2½ miles above gage.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 12, 1910, to September 30, 1915.

GAGE.—Staff gage in two sections on right bank; low-water section is inclined and fastened to abutment of bridge; upper section is vertical and fastened to sycamore tree 20 feet below bridge. Previous to January, 1914, flood gage was vertical staff fastened to right abutment. Gage read once a day by J. T. Weckert.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Solid rock and sand; fairly permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.4 feet during night of April 30 (discharge, 940 second-feet); minimum stage recorded, 0.54 foot September 27–29 (discharge, 0.9 second-foot).

1910–1915: Maximum stage recorded, 10.2 feet at 7 p. m. January 25, 1914 (discharge, about 7,400 second-feet, determined from extension of rating curve); minimum stage recorded, 0.35 foot August 27, 1913 (discharge, 0.8 second-foot).

DIVERSIONS.—About 20 second-feet is diverted by several small ditches for irrigation above the station.

REGULATION.—None.

ACCURACY.—Rating curves are fairly well defined except at extremely low stages. Results good, except for low stages.

Discharge measurements of North Fork of Kaweah River at Kaweah, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 20	R. C. Rice	0.67	6.2	June 10	H. J. Tompkins	2.11	205
21	.....do	.68	4.7				

Digitized by Google

Daily discharge, in second-feet, of North Fork of Kaweah River at Kaweah, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5.1	5.7	6.0	16	61	90	144	282	376	66	15	3.0
2	3.6	5.7	7.5	17	165	80	200	282	376	62	14	3.0
3	3.6	5.7	8.5	17	87	76	235	260	326	58	14	2.7
4	3.6	6.0	18	31	74	74	275	376	260	57	13	2.7
5	3.9	5.7	18	28	63	74	218	454	241	56	12	2.4
6	3.9	5.4	14	26	61	74	193	350	260	54	12	2.4
7	4.5	5.4	10	22	58	77	200	350	241	52	12	2.4
8	4.8	5.1	9.5	25	59	70	200	428	206	51	12	2.4
9	4.8	5.1	5.4	23	295	73	200	350	482	49	12	2.1
10	5.1	5.1	13	21	218	69	255	350	206	47	12	2.1
11	5.1	5.1	14	21	176	69	275	376	189	44	11	2.1
12	5.1	5.1	15	21	95	69	315	376	189	43	10	1.5
13	4.8	5.1	17	23	80	70	385	568	161	41	10	1.5
14	4.5	5.1	16	24	74	71	275	428	149	39	10	1.8
15	4.5	5.1	17	49	71	97	218	401	144	37	9.5	2.1
16	4.8	4.8	17	37	71	141	255	401	139	36	9.5	2.1
17	4.8	4.8	20	28	186	162	295	692	126	33	9.0	1.8
18	4.8	4.8	20	23	130	159	338	568	120	32	9.0	1.5
19	5.1	4.8	19	22	110	165	360	454	114	31	8.5	1.4
20	5.4	4.8	18	22	133	200	338	401	107	30	7.3	1.3
21	5.7	4.8	19	22	112	196	338	350	103	26	6.1	1.3
22	7.0	4.8	19	22	106	218	275	326	98	24	4.5	1.2
23	7.5	4.8	19	21	97	235	295	326	93	22	4.5	1.2
24	8.0	4.8	19	22	90	295	218	350	88	21	4.5	1.1
25	7.0	4.8	19	31	90	275	255	326	85	20	3.9	1.0
26	6.0	4.8	18	29	87	200	235	326	84	19	3.9	1.0
27	6.0	4.8	18	27	80	144	200	350	78	18	3.6	.9
28	5.4	4.8	17	71	83	147	218	376	72	17	3.3	.9
29	5.4	4.8	15	99	.....	275	295	376	69	18	3.3	.9
30	5.7	5.1	16	97	.....	162	435	401	68	19	3.3	1.3
31	5.7	.....	17	62	.....	153	.....	401	.....	16	3.0	.....

NOTE.—Discharge determined from two rating curves as follows: Oct. 1 to Apr. 30, fairly well defined above 25 second-feet; May 1 to Sept. 30, fairly well defined above 20 second-feet.

Monthly discharge of North Fork of Kaweah River at Kaweah, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	8.0	3.6	5.20	320	D.
November	6.0	4.8	5.09	303	D.
December	20	5.4	15.4	947	C.
January	99	16	32.2	1,980	C.
February	295	58	108	6,000	B.
March	295	69	137	8,420	B.
April	435	144	265	15,800	B.
May	692	260	389	23,900	B.
June	482	68	175	10,400	B.
July	66	16	36.7	2,260	B.
August	15	3.0	8.57	527	C.
September	3.0	.9	1.77	105	D.
The year	692	.9	98.0	71,000	

SOUTH FORK OF KAWEAH RIVER NEAR THREE RIVERS, CAL.

LOCATION.—In the SE. ¼ sec. 8, T. 18 S., R. 29 E., on Mehrten ranch, 500 feet above mouth of Cinnamon Creek, 4½ miles southeast of Three Rivers, Tulare County, and about 5 miles above junction with Kaweah River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 18, 1911, to September 30, 1915.

Digitized by Google

GAGE.—Vertical staff fastened to large boulder on right bank, read once a day by D. N. Mehrten.

DISCHARGE MEASUREMENTS.—Made from car and cable 300 feet above gage or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; rough and fairly permanent. Both banks are subject to overflow at extremely high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.6 feet at 5.45 a. m., June 1 (discharge, 600 second-feet); minimum stage recorded, 1.96 feet at 6.30 a. m., October 17 (discharge, 5.4 second-feet).

1911–1915: Maximum stage recorded, 5.8 feet at 8.15 a. m., January 25, 1914 (discharge, 1,460 second-feet); minimum stage recorded, 1.82 feet at 7.15 a. m., October 1, 1912 (discharge, 3.3 second-feet).

DIVERSIONS.—Two small ditches divert water for irrigation above the station.

REGULATION.—None.

ACCURACY.—Results good.

Discharge measurements of South Fork of Kaweah River near Three Rivers, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 20	R. C. Rice	2.00	5.8
June 9	H. J. Thompkins	4.33	471

Daily discharge, in second-feet, of South Fork of Kaweah River near Three Rivers, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	12	6	7	9	24	43	59	140	600	112	18	10
2	10	6	7	9	123	32	62	148	495	103	17	10
3	10	6	7	9	36	31	65	140	520	92	16	10
4	9	6	7	19	24	31	62	123	445	82	15	10
5	8.5	6	7	18	21	30	62	241	355	78	14	10
6	8	6	7	18	19	29	63	192	470	72	13	10
7	7.5	6	7	17	15	28	64	192	495	176	13	10
8	7	6	7	16	15	26	64	207	545	52	12	10
9	6.5	6	7	15	119	26	65	176	545	49	12	10
10	6.5	6	7.5	15	101	26	66	176	470	47	11	10
11	6	6	8.5	14	112	26	74	224	445	45	10	10
12	6	6	9	14	39	25	101	207	445	41	10	10
13	6	6	9	14	36	24	65	335	445	36	10	10
14	6	6	9	24	29	24	66	277	315	33	10	10
15	5.5	6	9	14	26	26	67	315	335	32	10	10
16	5.5	6	9	13	39	28	72	335	335	31	9.5	10
17	5.5	6	9.5	13	67	30	73	355	315	29	9	10
18	5.5	6	9.5	13	62	32	74	400	296	29	8	10
19	6	6	9.5	13	56	38	79	335	296	28	8	10
20	6	6.5	9.5	12	67	43	82	277	241	27	7.5	9.5
21	7	6.5	9.5	12	39	56	92	259	241	26	39	9.5
22	6	6.5	9	11	39	56	148	252	231	25	26	9
23	6	6.5	9	11	39	56	143	241	224	24	21	9
24	6	6.5	9	10	39	56	136	248	198	22	18	9
25	6	6.5	9	11	39	59	123	266	176	21	17	9
26	6	6.5	9	11	39	58	123	288	168	20	15	8.5
27	6	6.5	9	11	39	57	121	335	156	20	13	8
28	6	6.5	9	24	39	54	119	422	148	19	12	8
29	6	6.5	9	39	.....	54	116	445	136	19	11	8
30	6	6.5	9	43	.....	55	168	470	123	18	10	7.5
31	6	.....	9	29	.....	56	.....	545	.....	18	10	.....

NOTE.—Discharge determined from a fairly well defined rating curve.

Digitized by Google

Monthly discharge of South Fork of Kaweah River near Three Rivers, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	12	5.5	6.77	416	B.
November	6.5	6	6.18	368	B.
December	9.5	7	8.44	519	B.
January	43	9	16.2	996	B.
February	123	15	47.9	2,660	B.
March	59	24	39.2	2,410	B.
April	168	59	89.1	5,300	B.
May	545	123	276	17,000	B.
June	600	123	340	20,200	B.
July	176	18	46.0	2,830	B.
August	39	7.5	13.7	842	B.
September	10	7.5	9.50	565	B.
The year	600	5.5	74.8	54,100	

KINGS RIVER NEAR SANGER, CAL.

LOCATION.—In the NW. ¼ sec. 8, T. 13 S., R. 24 E., about half a mile below new highway bridge at Piedra, near mouth of canyon, southwest of Red Mountain, and about 12 miles northeast of Sanger, Fresno County.

DRAINAGE AREA.—1,740 square miles.

RECORDS AVAILABLE.—September 3, 1895, to September 30, 1915.

GAGE.—United States Weather Bureau inclined staff on left bank read once a day by A. V. Waugh. The flood of January, 1914, washed out the Friez water-stage recorder which was situated on the opposite bank at the same datum. The record from the present gage began January 30, 1914.

DISCHARGE MEASUREMENTS.—Made from car and cable 500 feet below gage.

CHANNEL AND CONTROL.—Gravel and small boulders; shifts slightly during high water. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.3 feet at 7 a. m. June 1 (discharge, 18,300 second-feet); minimum stage recorded, 3.3 feet at 7 a. m. December 3 (discharge, 180 second-feet).

1895–1915: Maximum stage recorded, 21.8 feet during night of January 25, 1914, determined by leveling from flood marks (discharge computed from extension of rating curve, 59,700 second-feet); minimum stage recorded, 3.7 feet January 21, 1904 (discharge, 130 second-feet).

DIVERSIONS.—Several miles above the station there is a small diversion for a flume used to float lumber to Sanger.

REGULATION.—None.

ACCURACY.—Results excellent.

Digitized by Google

Discharge measurements of Kings River near Sanger, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 24	R. C. Rice	3.93	361	June 8	H. J. Tompkins	12.10	13,000
Mar. 29	Charles Leidl	7.14	2,800	Sept. 5	H. D. McGlashan	4.42	539
29	do	7.03	2,640				

Daily discharge, in second-feet, of Kings River near Sanger, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	885	665	200	250	830	1,280	2,240	3,960	16,300	7,210	1,130	505
2	885	615	200	250	1,420	1,280	2,440	3,270	14,900	7,210	1,130	480
3	885	520	190	250	1,760	1,200	2,660	3,270	12,100	6,990	1,130	580
4	885	475	238	332	1,000	1,200	3,010	3,530	10,000	7,210	1,060	555
5	830	390	280	452	748	885	2,660	4,430	9,700	6,330	995	580
6	720	390	350	280	665	885	2,240	3,530	12,100	6,330	995	608
7	665	390	250	280	615	830	2,140	3,670	13,200	5,910	930	555
8	665	350	225	298	615	830	2,240	4,110	13,500	5,530	835	530
9	565	350	200	350	6,990	830	2,440	3,670	15,500	4,430	805	458
10	520	350	200	280	3,140	830	2,890	3,670	14,900	4,430	865	505
11	390	350	238	280	2,770	830	3,400	4,600	12,500	4,430	865	458
12	390	350	250	280	1,580	830	4,270	5,130	10,300	4,770	775	435
13	390	350	225	280	1,200	830	4,110	7,210	8,650	4,950	745	370
14	390	350	200	370	1,070	830	3,400	5,710	9,150	3,530	718	350
15	390	350	200	370	830	830	2,890	5,910	9,700	3,010	745	350
16	390	350	200	315	945	1,070	3,400	7,650	10,900	2,770	662	370
17	390	350	315	280	1,580	1,580	3,960	9,700	10,300	2,550	690	350
18	565	332	280	280	2,040	1,760	4,950	7,650	10,900	2,550	662	390
19	615	332	280	280	1,500	1,850	6,330	5,910	9,400	2,440	718	332
20	565	332	280	280	1,500	2,140	6,990	5,130	9,150	2,340	745	280
21	565	332	280	280	1,850	2,440	6,330	4,770	9,150	2,340	662	265
22	520	280	250	280	1,500	2,550	4,600	5,320	9,700	2,770	635	250
23	390	280	250	315	1,280	2,770	4,600	6,330	9,150	3,010	555	250
24	390	250	280	280	1,280	3,010	3,960	6,550	8,900	3,270	580	225
25	350	238	280	390	1,280	3,010	4,110	6,770	8,650	2,550	555	238
26	350	225	280	315	1,140	3,140	3,960	7,210	7,650	2,340	505	225
27	350	212	280	315	1,140	1,940	3,400	9,150	7,210	2,140	530	238
28	350	200	280	565	1,140	1,940	4,110	11,500	6,770	1,760	505	250
29	350	200	280	945	.....	3,010	4,110	10,600	7,900	1,500	480	250
30	475	200	250	1,500	.....	1,940	4,430	11,800	7,210	1,580	505	250
31	475	.....	250	885	.....	1,760	.....	14,200	.....	1,280	435	.....

NOTE.—Discharge determined from two rating curves as follows: Oct. 1 to June 1, well defined above 250 second-feet· June 2 to Sept. 30, well defined above 200 second-feet.

Monthly discharge of Kings River near Sanger, Cal., for the year ending Sept. 30, 1915.

[Drainage area, 1,740 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	885	350	534	0.307	0.35	32,800	A.
November	665	200	345	.198	.22	20,500	A.
December	350	190	250	.144	.17	15,400	A.
January	1,500	250	391	.225	.26	24,000	A.
February	6,990	615	1,550	.891	.93	86,100	A.
March	3,140	830	1,620	.931	1.07	99,600	A.
April	6,990	2,140	3,740	2.15	2.40	223,000	A.
May	14,200	3,270	6,320	3.63	4.18	389,000	A.
June	16,300	6,770	10,500	6.03	6.73	625,000	A.
July	7,210	1,280	3,790	2.18	2.51	233,000	A.
August	1,130	435	747	.429	.49	45,900	A.
September	608	225	383	.220	.25	22,800	A.
The year	16,300	190	2,510	1.44	19.56	1,820,000	

Digitized by Google

DINKEY CREEK NEAR OCKENDEN, CAL.

LOCATION.—In the NE. ¼ sec. 20, T. 10 S., R. 26 E., above trail bridge at Dinkey Creek ranger station, in Sierra National Forest, about 9½ miles southeast of Ockenden, Fresno County, and about 11 miles above junction with North Fork of Kings River. Bear Creek enters 1½ miles below and Rock Creek 3 miles above the station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 17, 1910, to September 29, 1915 (fragmentary), when the station was discontinued.

GAGE.—Vertical staff on right bank about 400 feet below ranger station, read once or twice a day by Roy Boothe.

DISCHARGE MEASUREMENTS.—Made from car and cable or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; fairly permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 3.9 feet, at 5.30 p. m., May 31; minimum stage recorded, 0.3 foot at 8 a. m. September 29.

1911–1915: Maximum stage recorded, 3.9 feet at 5.30 p. m. May 31, 1915; minimum stage recorded, 0.3 foot August and September, 1912, September, 1913 and 1915.

DIVERSIONS.—No information.

REGULATION.—No information.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Estimates of discharge not prepared since the year ending September 30, 1913, as no discharge measurements were secured.

Daily gage height, in feet, of Dinkey Creek near Ockenden, Cal., for the year ending Sept. 30, 1915.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	.....	3.45	.....	.....	.....	16	2.4	.....	2.7	.....	.....	.....
2	.....	.....	3.0	.....	.....	.....	17	2.2	.....	2.8	.....	.....	.....
3	.....	.....	.....	.....	.....	.....	18	.....	.....	.....	1.2	.....	.....
4	.....	.....	.....	.....	.....	.....	19	.....	.....	.....	.....	.5	.....
5	.....	.....	.....	.....	.....	.....	20	.....	.....	.....	.....	.....	.....
6	.....	.....	.....	.....	.....	.....	21	.....	.....	.....	.....	.....	.....
7	.....	.....	.....	.....	.....	.....	22	.....	.....	.....	.....	.....	.....
8	.....	.....	.....	.....	0.7	0.4	23	.....	.....	2.0	.....	.5	.....
9	.....	.....	.....	.....	.....	.....	24	.....	.....	.....	.....	.....	.....
10	.....	.....	.....	.....	.....	.....	25	.....	.....	2.0	.....	.....	.....
11	.....	.....	.....	.....	.....	.....	26	.....	.....	.....	.....	.....	.....
12	.....	.....	.....	.....	.....	.....	27	.....	3.15	.....	.....	.....	.....
13	.....	.....	2.4	.....	.....	.....	28	.....	3.15	.....	.9	.....	.....
14	.....	.....	2.6	.....	.6	.....	29	.....	3.5	.....	.....	.....	.3
15	.....	.....	2.0	.....	.....	.....	30	.....	3.3	.....	.....	.....	.....
							31	.....	3.5	.....	.....	.....	.....

Digitized by Google

SAN JOAQUIN RIVER BASIN.

SAN JOAQUIN RIVER NEAR SHAVER, CAL.

LOCATION.—In the N. ½ sec. 27, T. 8 S., R. 24 E., between Madera and Fresno counties, about 500 feet above junction with Big Creek, and 5 miles northwest of Shaver.

DRAINAGE AREA.—1,060 [1] square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 11, 1912, to September 30, 1915.

GAGE.—Storrow seven-day water-stage recorder on left bank.

DISCHARGE MEASUREMENTS.—Made from car and cable near gage.

CHANNEL AND CONTROL.—Rough broken rock; not likely to change.

EXTREMES OF DISCHARGE.—1912–1915: Maximum daily discharge, 15,300 second-feet, May 31, 1915; minimum mean daily discharge, 91 second-feet, January 8, 1913.

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Rating curve well defined; results good.

COOPERATION.—Daily discharge record furnished by the Pacific Light & Power Corporation, through R. C. Starr, hydraulic engineer.

Daily discharge, in second-feet, of San Joaquin River near Shaver, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	735	439	218	282	719	787	2,140	2,840	12,700	7,460	1,500	658
2	645	481	227	283	981	711	2,550	2,820	12,400	7,330	1,500	766
3	592	450	264	291	701	684	2,830	2,800	11,700	7,000	1,500	776
4	542	424	308	329	588	683	2,940	2,900	11,900	6,930	1,460	747
5	501	388	284	309	603	732	2,490	3,120	11,600	6,890	1,390	676
6	482	371	276	314	666	740	2,060	3,440	11,000	5,730	1,380	638
7	473	348	259	307	670	732	2,080	3,660	10,400	5,880	1,360	603
8	449	333	264	314	1,120	704	1,990	3,940	9,680	6,250	1,280	538
9	428	314	239	305	1,230	690	2,200	4,280	9,120	6,720	1,160	497
10	418	305	288	274	944	668	2,680	4,660	8,710	7,040	1,120	470
11	392	295	291	287	883	666	3,120	4,970	7,960	6,420	1,060	453
12	372	274	280	291	844	701	3,800	5,170	8,360	6,460	1,010	428
13	356	272	261	291	745	732	4,160	6,360	8,690	6,020	960	403
14	346	263	218	427	844	866	3,000	6,150	9,000	5,930	940	403
15	337	259	251	361	846	1,120	2,800	5,970	9,500	5,580	940	400
16	329	251	295	287	1,230	1,350	2,970	5,690	9,750	5,030	926	393
17	329	247	309	311	1,790	1,490	4,130	5,450	9,380	4,400	897	385
18	346	239	311	340	1,200	1,560	4,950	5,180	8,480	3,720	880	381
19	370	222	305	329	1,040	1,640	5,950	4,840	7,760	3,500	838	375
20	374	206	309	329	1,040	1,720	6,280	4,320	7,470	3,130	761	356
21	419	206	307	311	874	1,910	5,750	4,160	8,160	3,220	724	354
22	445	209	311	309	810	2,070	5,080	4,490	9,030	3,590	726	354
23	419	214	309	299	773	2,360	4,560	5,110	9,040	3,480	719	354
24	409	214	307	294	751	2,620	4,170	5,110	8,920	3,230	704	352
25	387	214	295	333	739	2,890	3,870	4,850	8,560	3,060	690	352
26	369	214	291	337	748	2,660	3,490	5,600	7,090	2,840	668	350
27	358	214	289	419	748	2,180	3,090	8,410	7,540	2,520	655	348
28	355	204	280	741	801	2,750	3,040	10,100	8,210	2,190	668	344
29	350	206	276	940	.....	2,740	3,080	11,800	8,120	1,880	686	333
30	397	222	274	688	.....	2,210	3,070	13,700	7,590	1,710	680	329
31	478	.....	280	578	.....	1,980	.....	15,300	.....	1,590	676	.....

[1] Area published in previous water-supply papers is in error.

Digitized by Google

Monthly discharge of San Joaquin River near Shaver, Cal., for the years ending Sept. 30, 1912–1915.

[Drainage area, 1,060[a] square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
1912.						
August 11–31	645	347	503	0.475	0.37	21,000
September	394	200	275	.259	.29	16,400
1912–13.						
October	285	162	211	.199	.23	13,000
November	332	183	225	.212	.24	13,400
December	193	106	152	.143	.16	9,350
January	321	91	195	.184	.21	12,000
February	381	231	289	.273	.28	16,000
March	1,400	263	493	.465	.54	30,300
April	4,270	1,010	1,890	1.78	1.99	112,000
May	7,120	1,790	4,540	4.28	4.93	279,000
June	5,030	2,490	3,680	3.47	3.87	219,000
July	2,680	1,090	1,980	1.87	2.16	122,000
August	3,560	535	1,400	1.32	1.52	86,100
September	2,680	288	700	.660	.74	41,700
The year	7,120	91	1,320	1.25	16.87	954,000
1913–14.						
October	280	180	215	0.203	0.23	13,200
November	430	202	318	.300	.33	18,900
December	1,750	238	389	.367	.42	23,900
January	9,900	645	2,110	1.99	2.29	130,000
February	5,000	1,250	1,840	1.74	1.81	102,000
March	3,270	1,820	2,490	2.35	2.71	153,000
April	5,570	2,000	3,850	3.63	4.05	229,000
May	7,210	2,680	5,100	4.81	5.54	314,000
June	7,930	3,810	5,480	5.17	5.77	326,000
July	5,570	2,310	3,730	3.52	4.06	229,000
August	2,480	810	1,690	1.59	1.83	104,000
September	1,800	445	698	.658	.73	41,500
The year	9,900	180	2,330	2.20	29.77	1,680,000
1914–15.						
October	735	329	426	.402	.46	26,200
November	481	204	283	.267	.30	16,800
December	311	218	280	.264	.30	17,200
January	940	274	371	.350	.40	22,800
February	1,790	588	890	.840	.87	49,400
March	2,890	666	1,460	1.38	1.59	89,800
April	6,280	1,990	3,480	3.28	3.66	207,000
May	15,300	2,800	5,720	5.40	6.23	352,000
June	12,700	7,090	9,260	8.74	9.75	551,000
July	7,460	1,590	4,730	4.46	5.14	291,000
August	1,500	655	983	.927	1.07	60,400
September	776	329	461	.435	.49	27,400
The year	15,300	204	2,360	2.23	30.26	1,710,000

[a] Supersedes figures published in previous reports.

NOTE.—Discharge in second-feet per square mile, and run-off (depth, in inches on drainage area), October 1913, to September, 1914, differ from that published in Water-Supply Paper 391, p. 140, because an erroneous figure was used for drainage area in that report.

SAN JOAQUIN RIVER NEAR FRIANT, CAL.

LOCATION.—In the NW. ¼ sec. 5, T. 11 S., R. 21 E., about 1½ miles northeast of Friant, Fresno County.

DRAINAGE AREA.—1,640 square miles at old location 2 miles upstream.

RECORDS AVAILABLE.—October 18, 1907, to September 30, 1915.

GAGE.—Gurley weight-driven printing water-stage recorder on left bank (Pl. IV, *B*,) installed December 9, 1913. Previous to that date the gage was a staff located on left bank in the SE. ¼ sec. 34, T. 10 S., R. 21 E., about 4 miles northeast of Friant (30 feet upstream from cable). Relation between old datum and new datum unknown.

Digitized by Google

DISCHARGE MEASUREMENTS.—Made from cable 2 miles upstream at site of original gage or by wading.

CHANNEL AND CONTROL.—Channel is composed of sand and gravel. Control is a solid rock dike about 500 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 13.05 feet from 8.30 to 9 a. m. June 1 (discharge, 15,900 second-feet); minimum stage from water-stage recorder, 3.61 feet from 6.30 to 6.45 a. m. December 2 (discharge, 313 second-feet).

1907–1915: Maximum stage recorded, 21.72 feet at 11.30 p. m. January 25, 1914 (discharge, 46,200 second-feet); minimum stage recorded, 3.25 feet October 17 to 19 and 22 to 29, 1913 (discharge, 170 second-feet).

DIVERSIONS.—Fresno Flume & Lumber Co. diverts about 10 second-feet from Stevenson Creek. This water is used for irrigation near Clovis.

REGULATION.—Storage is developed for power at Huntington Lake on Big Creek and at Crane Valley reservoir on North Fork Creek.

ACCURACY.—Results excellent except for short periods when water-stage recorder was not running.

Discharge measurements of San Joaquin River near Friant, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 15	R. C. Rice	4.39	593	Sept. 29	Charles Leidl	4.45	636
Mar. 30	Charles Leidl	7.55	2,830				

Daily discharge, in second-feet, of San Joaquin River near Friant, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,060	720	400	478	1,040	1,690	2,540	4,340	13,500	7,690	1,650	906
2	972	636	388	449	1,620	1,500	3,050	4,430	12,600	7,690	1,580	913
3	872	715	435	470	2,000	1,330	3,530	4,000	10,700	7,920	1,550	920
4	790	680	470	452	1,240	1,240	3,460	3,680	8,900	7,690	1,520	927
5	767	631	522	530	1,010	1,240	2,990	5,080	8,400	7,230	1,490	894
6	744	595	482	506	1,010	1,250	2,540	4,610	9,910	5,580	1,460	822
7	722	590	435	498	1,020	1,200	2,440	4,610	11,500	4,610	1,470	813
8	700	550	456	506	1,030	1,170	2,400	4,800	12,600	4,520	1,390	804
9	678	478	456	510	3,460	1,150	2,540	4,260	13,800	5,380	1,330	795
10	656	534	449	494	2,870	1,150	3,310	4,700	13,200	5,800	1,320	786
11	634	510	486	435	2,400	1,090	3,760	5,280	12,300	6,330	1,290	777
12	612	510	490	494	1,760	1,130	4,800	4,980	10,200	6,330	1,230	768
13	590	498	498	494	1,460	1,140	4,890	7,000	8,650	5,900	1,170	759
14	568	486	428	538	1,340	1,190	3,760	6,550	8,650	5,580	1,140	750
15	546	486	421	740	1,280	1,430	3,530	6,000	8,650	4,520	1,100	741
16	542	400	452	577	1,340	1,800	3,380	7,000	10,200	4,000	1,110	732
17	534	470	564	502	2,820	2,000	4,000	8,900	9,910	3,920	1,090	723
18	534	466	577	486	2,350	2,130	5,180	8,160	9,650	3,600	1,040	714
19	518	456	522	550	1,760	2,220	6,000	6,220	9,400	3,310	990	705
20	595	424	546	522	1,760	2,350	6,440	5,280	8,650	3,240	949	696
21	595	410	470	554	1,730	2,440	6,220	4,700	8,650	3,240	922	687
22	660	650	510	518	1,400	2,700	5,480	4,890	8,900	3,600	883	679
23	680	514	526	506	1,350	2,990	4,980	5,800	9,400	4,170	894	671
24	650	466	522	494	1,280	3,380	4,520	5,900	9,400	4,430	984	663
25	622	418	534	478	1,310	3,600	4,610	5,800	8,650	3,600	905	655
26	586	421	486	546	1,250	3,380	3,840	5,690	7,690	3,310	883	647
27	577	394	494	546	1,150	2,820	4,430	8,160	7,120	2,870	834	639
28	572	421	470	927	1,340	2,650	4,890	10,200	7,920	2,440	795	631
29	554	428	482	1,650	.....	4,000	5,180	9,650	8,160	2,130	762	572
30	550	400	478	1,730	.....	2,930	5,180	9,910	7,920	1,920	790	559
31	622	.....	474	1,090	.....	2,400	.....	11,200	.....	1,760	900	.....

NOTE.—Discharge determined from a rating curve well defined below 20,000 second-feet. Discharge, Oct. 5–14, Aug. 3–5, Sept. 1–3 and 7–27, when water-stage recorder was not running, estimated by interpolation.

Digitized by Google

Monthly discharge of San Joaquin River near Friant, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1,060	518	655	40,300	B.
November	720	394	512	30,500	A.
December	577	388	481	29,600	A.
January	1,730	435	622	38,200	A.
February	3,460	1,010	1,620	90,000	A.
March	4,000	1,090	2,020	124,000	A.
April	6,440	2,400	4,130	246,000	A.
May	11,200	3,680	6,190	381,000	A.
June	13,800	7,120	9,840	586,000	A.
July	7,920	1,760	4,660	287,000	A.
August	1,650	762	1,140	70,100	A.
September	927	559	745	44,300	
The year	13,800	388	2,710	1,970,000	

SAN JOAQUIN RIVER NEAR NEWMAN, CAL.

LOCATION.—In the SW. ¼ sec. 3, T. 7 S., R. 9 E., at drawbridge on Hill's ferry road, 300 feet below mouth of Merced River, and 3½ miles northeast of Newman, Stanislaus County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 29, 1912, to September 30, 1915.

GAGE.—Vertical staff fastened to upstream side of downstream support of draw span, located 60 feet below the bridge in the middle of the stream; read once a day by Rasmus Lorensen.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Composed of sand and small gravel which shifts during high water. Both banks are subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 15.6 feet at 7 a. m. June 12, 20, and 21 (discharge, 15,200 second-feet); minimum stage recorded, 2.0 feet at 7 a. m. September 28 (discharge, 145 second-feet).

1912–1915: Maximum stage recorded, 18.0 feet at 9 a. m., January 27, 1914 (discharge, 20,700 second-feet); minimum stage recorded, 1.0 foot October 5 and 8 to 18, 1913 (discharge, 50 second-feet).

DIVERSIONS.—Practically the entire low-water flow of main river and tributaries is diverted for irrigation purposes, hence the low-water records show the amount of return water.

REGULATION.—Storage is developed for power at Huntington Lake on Big Creek and at Crane Valley reservoir on North Fork Creek.

ACCURACY.—Changes in rating curve are fairly well defined by discharge measurements; results good.

Discharge measurements of San Joaquin River near Newman, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 14	R. C. Rice	2.12	219	Aug. 28	Charles Leidl	2.65	272
Feb. 1	Charles Leidl	7.70	3,830	Sept. 25	.....do	2.14	173
Apr. 1	.....do	8.01	4,090				

Digitized by Google

Daily discharge in second-feet of San Joaquin River near Newman Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	215	275	295	540	3,540	5,890	4,080	5,460	11,900	12,100	1,390	248
2	450	275	295	510	5,160	6,000	4,260	5,260	12,400	11,700	1,270	235
3	420	285	345	480	6,330	5,780	4,260	5,160	12,800	11,200	1,090	225
4	370	295	320	480	7,580	5,560	4,170	5,160	12,800	11,000	980	215
5	320	320	320	480	6,330	5,260	4,080	5,160	12,200	10,700	880	215
6	285	345	420	540	5,890	5,060	3,900	5,560	12,100	10,300	780	235
7	275	370	570	610	5,670	4,660	3,720	5,560	12,800	10,000	690	235
8	265	370	610	610	4,860	4,260	3,720	5,670	13,600	9,210	600	225
9	255	345	610	610	4,260	3,990	3,810	5,780	14,400	8,750	600	225
10	235	370	540	690	9,050	3,810	3,540	6,000	15,000	8,300	540	235
11	225	345	510	880	9,370	3,630	3,280	6,110	15,000	7,860	520	225
12	215	345	395	780	10,300	3,450	3,360	6,380	15,200	7,040	480	215
13	215	345	420	690	9,530	3,120	3,720	7,040	14,400	6,130	445	205
14	215	345	420	610	9,370	2,880	3,900	9,210	14,400	5,370	410	205
15	215	320	395	610	9,210	2,880	4,080	8,900	14,200	5,010	410	215
16	215	320	370	1,090	8,150	2,800	4,080	8,300	14,400	4,770	392	215
17	215	295	370	880	7,170	2,800	4,460	8,750	14,800	4,550	345	215
18	215	295	395	780	6,790	2,720	4,660	9,850	15,000	4,550	345	195
19	225	320	420	690	6,910	2,720	5,160	11,000	15,000	4,330	345	185
20	235	345	480	690	6,110	2,480	5,460	10,500	15,200	3,800	345	175
21	255	370	480	610	7,170	2,880	5,890	10,000	15,200	3,500	315	168
22	275	370	540	610	7,440	3,120	6,000	9,530	15,000	3,140	300	160
23	275	320	540	540	7,170	3,280	6,110	9,370	15,000	2,870	285	160
24	275	320	540	540	7,440	3,540	6,110	9,850	14,800	2,620	285	160
25	275	295	510	540	7,170	3,720	6,110	10,000	14,400	2,300	272	160
26	275	295	480	510	6,550	3,900	6,220	10,000	14,200	2,000	260	168
27	295	295	480	540	5,890	3,630	6,220	9,690	13,600	1,930	260	160
28	275	320	480	650	5,460	3,540	5,890	10,300	13,000	2,000	260	145
29	275	320	510	1,210	.....	3,630	5,560	11,300	12,400	2,000	260	160
30	275	295	480	3,200	.....	4,660	5,460	11,700	12,400	1,860	272	168
31	275	.....	540	3,450	.....	4,360	.....	11,700	.....	1,650	260	.....

NOTE.—Discharge determined from three rating curves, as follows: Oct. 1 to Jan. 29, fairly well defined; Jan. 30 to June 20, well defined; and June 21 to Sept. 30, fairly well defined.

Monthly discharge of San Joaquin River, near Newman, Cal., for the year ending Sept, 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	450	215	268	16,500	B.
November	370	275	324	19,300	B.
December	610	295	454	27,900	B.
January	3,450	480	827	50,800	B.
February	10,300	3,540	7,000	389,000	A.
March	6,000	2,480	3,870	238,000	A.
April	6,220	3,280	4,710	280,000	A.
May	11,700	5,160	8,200	504,000	A.
June	15,200	11,900	13,900	827,000	A.
July	12,100	1,650	5,890	362,000	B.
August	1,390	260	512	31,500	B.
September	248	145	198	11,800	B.
The year	15,200	145	3,810	2,760,000	

BIG CREEK NEAR BIG CREEK,[1] CAL.

LOCATION.—In the SW. ¼ NW. ¼ sec. 14,[2] T. 8 S., R. 25 E., at Huntington Lake, 2½ miles northeast of Big Creek, Fresno County.

DRAINAGE AREA.—79[3] square miles (measured by Pacific Light & Power Corporation).

RECORDS AVAILABLE.—January 1, 1910, to September 30, 1915.

GAGE.—Hook gage at Huntington Lake.

[1] Formerly called "Big Creek near Shaver."
[2] Section location previously published is in error
[3] Revised; measured on topographic map.

Digitized by Google

DISCHARGE.—Flow into lake computed from reservoir records.

ACCURACY.—Mean discharge for month is accurate, but daily discharge may be in error, as inflow is determined from stage of lake and records of outflow from reservoir. As lake is 4 miles in length, the effect of wind on stage is very noticeable at times. This explains variations in inflow during low water and also the omission of discharge on certain days when weather conditions were unfavorable.

COOPERATION.—Estimates of daily discharge were furnished by the Pacific Light & Power Corporation through R. C. Starr, hydraulic engineer.

Daily discharge, in second-feet, of Big Creek, near Big Creek, Cal., for the year ending Sept. 30, 1915.

Days.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	12	18	(a)	22	44	2.7	122	846	1,430	251	35	(a)
2	4.5	26	5.7	.7	42	.3	110	257	1,430	200	5.0	6.2
3	7.0	34	3.8	13	66	9.2	132	110	1,290	167	27	2.9
4	13	10	15	11	7.5	34	169	408	1,110	222	18	17
5	16	12	28	15	13	15	120	276	997	153	14	27
6	21	10	.2	22	11	12	105	209	1,180	111	16	(a)
7	4.0	23	3.1	21	10	40	103	224	1,290	112	16	(a)
8	8.5	(a)	7.8	21	36	16	107	281	1,340	193	2.9	14
9	75	(a)	(a)	11	86	9.5	115	345	1,130	154	11	5.0
10	25	(a)	26	6.8	63	28	130	30	1,390	142	21	2.1
11	18	12	17	11	46	21	149	310	1,220	139	7.0	(a)
12	12	4.5	30	6.4	12	11	209	716	1,140	119	7.5	8.5
13	(a)	12	(a)	14	6.0	23	199	459	879	107	2.7	(a)
14	18	18	3.6	35	4.4	14	178	50	1,030	94	19	9.6
15	19	7.0	3.0	22	22	23	164	483	1,120	81	14	.2
16	12	(a)	6.0	8.3	13	41	198	730	765	66	(a)	13
17	(a)	6.0	10	.0	55	57	245	900	787	82	15	12
18	42	3.3	14	12	17	65	320	548	652	51	2.7	2.1
19	5.4	20	(a)	21	15	74	371	417	695	57	6.3	11
20	2.5	22	53	20	10	75	436	357	709	68	1.4	(a)
21	32	(a)	(a)	13	60	91	398	351	542	76	1.8	9.5
22	17	(a)	12	4.2	14	110	341	374	509	60	17	(a)
23	11	(a)	8.7	7.7	32	106	331	490	579	28	(a)	6.4
24	15	13	27	13	(a)	135	310	505	526	23	14	(a)
25	14	(a)	28	19	13	137	337	482	688	23	8.2	26
26	2.6	10	(a)	17	11	102	318	53	359	22	1.9	1.8
27	11	(a)	5.7	9.8	12	86	779	859	482	34	11	2.8
28	5.7	42	(a)	43	38	100	377	1,010	203	24	(a)	4.7
29	13	(a)	20	35	.....	162	185	983	240	15	14	4.2
30	17	13	(a)	32	.....	101	126	1,110	319	33	(a)	6.2
31	12	.....	13	13	.....	71	.....	1,290	.....	42	4.2	.....

a Gage not read; weather unfavorable for accurate observation; discharge combined with next record.

Monthly discharge of Big Creek near Big Creek, Cal., for the year ending Sept. 30, 1915.

[Drainage area, 79 square miles.]

Month.	Discharge in second-feet.		Run-off.	
	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	16.1	0.204	0.24	990
March	57.2	.724	.83	3,520
April	239	3.03	3.38	14,200
May	499	6.32	7.29	30,700
June	868	11.0	12.27	51,600
July	95.1	1.20	1.38	5,850

NOTE.—Monthly discharge computed by engineers of the U. S. Geological Survey.

Digitized by Google

PITMAN CREEK AT BIG CREEK, CAL.

LOCATION.—In the E. ½ sec. 28, T. 8 S., R. 25 E., in Fresno County, just above junction with Big Creek, and about half a mile southeast of Big Creek.

DRAINAGE AREA.—27 square miles (measured on topographic map by Pacific Light & Power Corporation).

RECORDS AVAILABLE.—January 1, 1910, to September 30, 1915.

GAGE.—Hook gage on right bank in pool above weir. Previous to 1913 a Watson water-stage recorder on right bank was used.

DISCHARGE.—Computed from gage heights giving head on 38-foot masonry weir. The crest is a three-eighths-inch angle bolted to the masonry. Formula used: $Q=3.66L(h-H)^{\frac{3}{2}}$.

CHANNEL AND CONTROL.—See information under "Discharge."

EXTREMES OF DISCHARGE.—1910–1915: Maximum mean daily discharge, 1,280 second feet, June 17, 1911; minimum mean daily discharge, 0.1 second-foot occurred a few days in August, 1910, and September and October, 1913.

WINTER FLOW.—Flow for winter period determined with same degree of accuracy as that for remainder of year.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Much care was exercised in the installation of the equipment, and results are believed to be good.

COOPERATION.—Estimates of daily discharge were furnished by the Pacific Light & Power Corporation through R. C. Starr, hydraulic engineer.

Daily discharge, in second-feet, of Pitman Creek at Big Creek, Cal., for the year ending Sept. 30; 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.5	0.5	0.5	0.5	3.0	3.0	15	89	405	60	4.0	1.0
2	1.0	2.0	.5	.5	1.0	3.0	15	89	370	56	4.0	1.0
3	1.0	1.0	.5	.5	2.0	2.0	19	89	299	53	5.0	1.0
4	1.0	1.0	.5	.5	1.0	2.0	19	64	279	46	4.0	1.0
5	.5	1.0	.5	.5	1.0	2.0	34	64	84	46	3.0	1.0
6	.5	1.0	.5	.5	1.0	2.0	34	64	159	42	3.0	1.0
7	.5	1.0	.5	.5	2.0	2.0	34	59	159	35	2.0	1.0
8	.5	1.0	.5	.5	1.0	2.0	28	67	176	21	2.0	1.0
9	.5	1.0	.5	.5	3.0	2.0	28	84	324	21	2.0	1.0
10	.5	1.0	.5	.5	3.0	3.0	28	81	313	18	2.0	1.0
11	.5	1.0	.5	.5	3.0	3.0	28	84	300	17	2.0	1.0
12	.5	1.0	.5	.5	2.0	3.0	35	94	155	22	2.0	1.0
13	.5	1.0	.5	.5	2.0	3.0	65	103	202	21	2.0	1.0
14	.5	1.0	.5	.5	2.0	3.0	75	103	180	20	2.0	1.0
15	.5	1.0	.5	.5	1.5	3.0	75	92	180	19	2.0	1.0
16	.5	1.0	.5	.5	2.0	3.0	62	117	181	18	2.0	1.0
17	.5	1.0	.5	.5	3.0	4.0	77	100	181	17	2.0	1.0
18	.5	1.0	.5	.5	3.0	4.0	77	185	164	14	2.0	1.0
19	1.0	1.0	.5	.5	3.0	4.0	120	105	159	13	2.0	1.0
20	1.0	1.0	.5	.5	3.0	7.0	129	105	146	13	2.0	1.0
21	1.0	1.0	.5	.5	3.0	7.0	129	84	119	11	2.0	1.0
22	1.0	.5	.5	.5	3.0	10	125	119	125	11	2.0	1.0
23	1.0	.5	.5	.5	3.0	17	125	119	114	10	2.0	1.0
24	1.0	.5	.5	.5	3.0	22	103	139	100	9.0	2.0	1.0
25	1.0	.5	.5	.5	3.0	24	92	169	95	8.0	2.0	1.0
26	1.0	.5	.5	.5	3.0	28	103	163	82	6.0	2.0	1.0
27	1.0	.5	.5	.5	3.0	29	98	176	73	5.0	1.0	1.0
28	.5	.5	.5	3.0	3.0	23	92	214	73	4.0	1.0	1.0
29	.5	.5	.5	5.0	.....	33	92	234	66	4.0	1.0	1.0
30	1.0	.5	.5	3.0	.....	28	98	324	65	4.0	1.0	1.0
31	1.0	.....	.5	6.0	.....	28	.....	382	.....	4.0	1.0	.....

Digitized by Google

Monthly discharge of Pitman Creek at Big Creek, Cal., for the year ending Sept. 30, 1915.

[Drainage area, 27 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	1.0	0.5	0.73	0.027	0.03	45
November	2.0	.5	.87	.032	.04	52
December	.5	.5	.50	.019	.02	31
January	6.0	.5	.98	.036	.04	60
February	3.0	1.0	2.38	.088	.09	132
March	33	2.0	9.97	.369	.43	613
April	129	15	68.5	2.54	2.83	4,080
May	382	59	128	4.74	5.46	7,870
June	405	65	178	6.59	7.35	10,600
July	60	4.0	20.9	.774	.89	1,290
August	5.0	1.0	2.19	.081	.09	135
September	1.0	1.0	1.00	.037	.04	60
The year	405	.5	34.4	1.27	17.31	25,000

NOTE.—Monthly and yearly discharge computed by engineers of the U. S. Geological Survey.

CRANE VALLEY RESERVOIR NEAR NORTH FORK, CAL.

LOCATION.—Crane Valley reservoir was formed by constructing a dam on North Fork Creek, in the E. ½ sec. 26, T. 7 S., R. 22 E., about 4½ miles north of North Fork, Madera County.

DRAINAGE AREA.—Not reported.

RECORDS AVAILABLE.—April 1, 1910, to September 30, 1915.

GAGE.—No information.

DISCHARGE MEASUREMENTS.—No information.

EXTREMES OF DISCHARGE.—1910–1915: Maximum mean daily discharge into reservoir, 2,750 second-feet January 30, 1911; minimum mean daily inflow, 2.0 second-feet October 2, 6, and 31, 1913.

DIVERSIONS.—Water is diverted into the reservoir from South Fork Creek about one-fourth mile below the mouth of Browns Creek.

REGULATION.—No information.

COOPERATION.—Daily-discharge record furnished by San Joaquin Light & Power Corporation.

The records show the total inflow into the reservoir. The water released from the reservoir flows down the natural channel of North Fork Creek to a point just above the mouth of South Fork Creek, where it is diverted into the power canal.

Digitized by Google

Daily discharge, in second-feet, into Crane Valley reservoir near North Fork, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	8.0	29	7.0	12	74	73	116	130	187	65	30	10
2	8.7	14	7.0	12	218	72	102	119	222	57	27	11
3	8.2	9.7	41	12	96	71	116	156	194	55	25	12
4	8.9	8.0	39	20	74	74	100	231	198	40	20	13
5	7.8	7.8	21	13	83	75	103	161	179	50	28	14
6	8.8	7.3	19	21	58	69	97	159	187	48	16	15
7	8.2	7.9	21	16	56	62	101	166	228	52	23	13
8	9.5	8.2	14	32	299	63	87	164	212	58	8.5	16
9	8.4	8.5	20	18	266	63	79	146	194	45	16	10
10	8.2	8.1	36	19	182	53	102	151	161	50	22	10
11	8.9	8.5	16	22	116	63	110	163	147	41	17	10
12	7.8	8.0	12	16	91	50	145	280	105	54	15	12
13	7.6	7.7	11	34	84	63	153	315	123	47	17	22
14	7.2	8.2	10	65	73	57	112	213	106	45	4.6	12
15	7.5	8.6	11	18	67	84	107	191	113	49	19	13
16	7.1	8.3	21	16	161	96	107	234	118	51	8.4	13
17	7.8	8.0	43	11	296	107	107	359	116	51	15	12
18	8.4	8.0	18	8.0	134	58	121	228	99	44	22	9.7
19	8.0	8.0	17	9.5	99	113	130	256	86	32	23	12
20	20	7.5	16	13	136	109	131	202	76	52	15	12
21	9.8	7.3	12	7.0	74	91	165	167	73	35	19	14
22	9.0	7.0	9.9	10	79	114	150	159	83	31	15	13
23	8.4	7.4	9.2	10	90	100	115	183	70	52	12	14
24	8.0	7.1	9.7	23	59	103	98	160	74	31	12	9.6
25	7.6	7.0	10	41	72	98	102	178	49	40	13	12
26	7.4	7.0	11	18	73	99	85	180	48	40	12	13
27	7.0	7.0	12	80	50	100	96	193	46	33	15	14
28	7.0	7.0	11	146	119	267	91	204	50	28	18	20
29	14	7.0	12	248	.....	146	222	218	52	41	19	11
30	9.2	7.0	11	99	.....	118	167	212	56	29	20	13
31	8.4	.....	11	86	.....	116	.....	207	.....	31	9.2	.....

Monthly discharge into Crane Valley reservoir near North Fork, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	20	7.0	8.74	537
November	29	7.0	8.67	516
December	43	7.0	16.7	1,030
January	248	7.0	37.3	2,290
February	299	50	117	6,500
March	267	50	91.2	5,610
April	222	79	117	6,960
May	359	119	196	12,100
June	228	46	122	7,260
July	65	28	44.4	2,730
August	30	4.6	17.3	1,060
September	22	9.6	12.8	762
The year	359	4.6	65.4	47,400

NOTE.—Monthly and yearly discharge computed by engineers of the U. S. Geological Survey.

786°—18—WSP 411——10

Digitized by Google

EVAPORATION FROM CRANE VALLEY RESERVOIR NEAR NORTH FORK, CAL.

LOCATION.—In T. 7 S., R. 22 E., about 5 miles northwest of North Fork, Madera County.

RECORDS AVAILABLE.—June 1, 1910, to September 30, 1915 (not complete).

EQUIPMENT.—No information.

METHOD.—Evaporation measured in a pan floating on the reservoir.

ELEVATION.—About 3,350 feet above sea level.

COOPERATION.—Data furnished by San Joaquin Light & Power Corporation.

Daily evaporation in feet from Crane Valley reservoir near North Fork, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	June.	July.	Aug.	Sept.	Day.	Oct.	June.	July.	Aug.	Sept.
1	0.005	0.01	0.027	0.023	0.025	16	.005	.03	.020	.021	.020
2	.01	.01	.015	.023	.025	17	.....	.02	.025	.022	.018
3	.015	.01	.018	.023	.022	18	.005	.015	.027	.020	.022
4	.01	.02	.025	.025	.025	19	.005	.027	.015	.022	.022
5	.015	.02	.017	.023	.027	20	.....	.018	.020	.023	.020
6	.015	.02	.023	.024	.028	21	.....	.025	.018	.022	.020
7	.01	.03	.020	.025	.029	22	.01	.020	.020	.022	.020
8	.01	.02	.017	.024	.025	23	.01	.022	.030	.023	.020
9	.015	.02	.018	.025	.019	24	.01	.015	.020	.020	.011
10	.01	.02	.022	.023	.025	25	.01	.014	.020	.013	.013
11	.01	.03	.013	.024	.026	26	.01	.011	.030	.027	.015
12	.015	.02	.015	.022	.024	27	.005	.010	.025	.020	.017
13	.015	.02	.020	.023	.026	28	.005	.015	.018	.021	.019
14	.01	.01	.030	.021	.022	29	.....	.020	.039	.012	.018
15	.01	.02	.020	.022	.022	30	.005	.023	.025	.025	.014
						31	.005	.....	.023	.028	.....

SOUTH FORK CREEK[1] NEAR NORTH FORK, CAL.

LOCATION.—In the SE. ¼ sec. 19, T. 8 S., R. 23 E., at concrete weir just above mouth, about 5 miles east of North Fork, Madera County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 1, 1910, to September 30, 1915.

GAGE.—Watson water-stage recorder which shows head on weir.

DISCHARGE.—Computed from gage-height record which indicates head on 100-foot, broad-crested concrete weir. Weir rating is checked by current meter measurements.

EXTREMES OF DISCHARGE.—1910–1915: Maximum mean daily discharge, 3,000 second-feet (estimated by the San Joaqufn Light & Power Corporation) January 25, 1914; minimum mean daily discharge, 1 second-foot June 30 to September 13, September 19 to October 11, and October 23 to November 11, 1910.

DIVERSIONS.—Below the mouth of Browns Creek, about 6 miles above the station, water is diverted from South Fork Creek into Crane Valley reservoir. This diversion is combined with the discharge at the gaging station in order that record will show total run-off from the watershed.

REGULATION.—None.

COOPERATION.—Daily-discharge record furnished by San Joaquin Light & Power Corporation.

[1] Also known as South Fork of Willow Creek.

Digitized by Google

Daily discharge, in second-feet, of South Fork Creek near North Fork, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5.6	11	5.0	9.8	69	30	97	126	214	17	3	9
2	5.6	8.2	5.0	9.8	120	22	117	111	207	15	3	7
3	5.6	7.5	7.5	9.8	48	21	97	139	186	14	6.5	7
4	5.6	7.5	11	15	30	21	100	191	160	13	7.5	7
5	5.6	8.2	7.5	14	24	21	90	150	156	12	12	7
6	5.6	8.2	6.2	13	18	21	84	160	160	11	8	6
7	5.6	8.2	5.0	13	16	21	84	180	160	11	9.5	6
8	5.0	8.2	5.0	16	95	21	98	212	156	11	9	7
9	5.0	8.2	6.2	11	225	24	105	168	124	10	9	7
10	5.0	7.5	7.5	9.0	75	21	112	213	116	10	12	7
11	5.0	7.5	7.5	9.8	65	18	128	217	112	9	12	7
12	5.0	7.5	6.2	9.8	52	17	355	240	109	9	12	7
13	5.0	7.5	5.0	12	35	17	210	259	101	6	12	7
14	4.5	7.5	5.0	21	26	50	138	239	94	6	12	7
15	4.5	7.5	5.0	14	24	84	138	214	91	6	12	7
16	4.5	7.5	7.5	13	75	90	138	375	84	5	12	7
17	4.0	7.5	12	12	120	84	154	333	81	5	11	7
18	4.0	7.5	7.5	11	75	84	170	231	74	5	11	7
19	4.0	7.5	6.2	11	50	90	169	204	71	4.5	11	7
20	9.0	6.2	6.2	12	55	90	165	207	65	4.5	11	7
21	9.0	6.2	5.0	12	40	90	171	195	60	4	9.5	7
22	7.5	6.2	7.5	14	30	90	152	177	60	4	9	7
23	7.5	6.2	7.5	15	22	121	144	207	59	4	9	7
24	8.2	5.0	7.5	18	23	121	123	207	60	4	9	7
25	7.5	5.0	9.0	19	22	112	108	187	53	3.5	9	7
26	7.5	5.0	9.0	14	21	78	106	212	50	3	9	7
27	7.5	5.0	9.0	18	21	134	109	230	47	3	9	8
28	8.2	5.0	8.2	59	30	98	122	212	43	3	9	8
29	9.0	5.0	9.0	86	.....	99	191	218	25	3	9	8
30	9.0	5.0	9.0	64	.....	90	129	218	18	3	9	7
31	8.2	.....	9.0	45	.....	91	.....	223	.....	3	9	.....

Monthly discharge of South Fork Creek near North Fork, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	9.0	4.0	6.22	382
November	11	5.0	7.00	417
December	12	5.0	7.22	444
January	86	9.0	19.7	1,210
February	225	16	53.8	2,990
March	134	17	63.6	3,910
April	355	84	137	8,150
May	375	111	208	12,800
June	214	18	99.9	5,940
July	17	3	7.15	440
August	12	3	9.52	585
September	9	6	7.1	420
The year	375	3	52.0	37,700

NOTE.—Monthly and yearly discharge computed by engineers of the U. S. Geological Survey.

WHISKEY CREEK NEAR NORTH FORK, CAL.

LOCATION.—In the SE. ¼ sec. 16, T. 8 S., R. 23 E., just above highway bridge about one-fourth mile below Cascadel ranch, and 6 miles east of North Fork, Madera County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 1, 1910, to September 30, 1915.

GAGE.—Staff on left bank about 500 feet above bridge.

Digitized by Google

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Gravel.

EXTREMES OF DISCHARGE.—1910–1915: Maximum mean daily discharge, 1,000 second-feet (estimated by San Joaquin Light & Power Corporation) January 25, 1914; minimum mean daily discharge, 1 second-foot September 26 to October 6, 1913.

DIVERSIONS.—No information.

REGULATION.—None.

COOPERATION.—Daily-discharge record furnished by San Joaquin Light & Power Corporation.

Daily discharge, in second-feet, of Whiskey Creek near North Fork, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.5	3	1.5	2.5	45	42	37	43	86	19	6.5	6
2	1.5	2.5	1.5	2.5	65	36	38	42	85	18	6.5	6
3	1.5	2.5	2	2.5	35	35	37	65	76	18	6.5	6
4	1.5	2.5	4.5	4.5	21	35	37	70	65	18	6.5	6
5	1.5	2.5	2	4.5	20	35	35	68	64	17	6.4	6
6	1.5	2.5	2	4.5	19	35	35	68	65	17	6.4	6
7	1.5	2.5	1.5	4.5	16	35	40	78	65	16	6.4	6
8	1.5	2.5	1.5	5	55	35	35	82	63	16	6.4	6
9	1.5	2.5	1.5	4	100	40	40	80	50	16	6.4	6
10	1.5	2	2	3	60	35	42	85	47	16	6.4	6
11	1.5	2	2	3	43	19	44	85	46	16	6.4	6
12	1.5	2	1.5	3	35	17	92	90	44	16	6.4	6
13	1.5	2	1.5	4	44	17	70	92	42	15	6.4	6
14	1	2	1.5	7.5	40	34	65	88	39	15	6.3	6
15	1	2	1.5	4.5	40	52	65	85	38	15	6.3	6
16	1	2	2	4.5	60	55	65	90	35	14	6.3	6
17	1	2	2	4	65	52	70	95	33	14	6.3	6
18	1	1.5	2.5	3.5	60	52	65	90	30	13	6.3	6
19	1	1.5	2	3.5	34	55	65	88	29	12	6.3	6
20	4	1.5	1.5	4	37	55	65	88	26	12	6.3	6
21	3.5	1.5	1.5	4	30	55	67	85	25	11	6.3	6
22	2	1.5	1.5	4	40	55	67	82	24	11	6.3	6
23	2	1.5	1.5	4.5	36	60	60	85	23	10	6.2	6
24	2	1.5	2.5	6	37	60	55	85	23	10	6.2	6
25	1.5	1.5	2	6.5	36	58	50	86	22	9.7	6.2	6
26	1.5	1.5	2	5	35	45	50	86	22	9.4	6.2	6
27	1.5	1.5	2.5	6	35	65	50	88	19	9.1	6.2	6
28	2	1.5	2.5	21	42	55	50	88	17	8.8	6.2	6
29	3	1.5	2.5	23	.....	58	55	86	16	8.4	6.2	6
30	3	1.5	2.5	20	.....	55	50	87	15	8.1	6.1	6
31	2.5	.....	2.5	15	.....	55	.....	87	.....	7.8	6.1	.....

Monthly discharge of Whiskey Creek near North Fork, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	4	1	1.74	107
November	3	1.5	1.95	116
December	4.5	1.5	1.98	122
January	23	2.5	6.26	385
February	100	16	42.3	2,350
March	65	17	44.9	2,760
April	92	35	53.2	3,170
May	95	42	81.2	4,990
June	86	15	41.1	2,450
July	19	7.8	13.4	824
August	6.5	6.1	6.32	389
September	6	6	6.0	357
The year	100	1	24.9	18,000

NOTE.—Monthly and yearly discharge computed by engineers of U. S. Geological Survey.

Digitized by Google

MERCED RIVER ABOVE ILLILOUETTE CREEK, NEAR YOSEMITE, CAL.

LOCATION.—Three-fourths mile above power house, and 2¼ miles southeast of Yosemite, Mariposa County; 1,000 feet above mouth of Illilouette Creek.

DRAINAGE AREA.—118 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 21 to September 30, 1915.

GAGE.—Vertical enameled staff fastened to a 2 by 6 inch timber bolted to a large boulder on left bank, about 500 feet below a small island; read once a day by an employee of Yosemite National Park.

DISCHARGE MEASUREMENTS.—Made by wading about 300 feet below gage.

CHANNEL AND CONTROL.—Composed of large boulders and medium-sized gravel; may shift at high stages. Banks high and not subject to overflow.

WINTER FLOW.—Stage-discharge relation possibly affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Results good.

COOPERATION.—Gage-height record furnished by officials of Yosemite National Park.

Discharge measurements of Merced River above Illilouette Creek, near Yosemite, Cal., during the year ending Sept. 30, 1915.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Aug. 22	2.38	108	Sept. 26	1.48	29
22	2.38	105	27	1.47	27
23	2.38	105			

Daily discharge, in second-feet, of Merced River above Illilouette Creek, near Yosemite, Cal., for the year ending Sept. 30, 1915.

Day.	Aug.	Sept.	Day.	Aug.	Sept.	Day.	Aug.	Sept.
1	.....	96	11	.....	50	21	108	20
2	.....	101	12	.....	a 44	22	a 104	20
3	.....	94	13	.....	37	23	101	20
4	.....	115	14	.....	a 34	24	101	a 23
5	.....	a 122	15	.....	a 31	25	101	26
6	.....	a 129	16	.....	28	26	94	a 26
7	.....	136	17	.....	26	27	82	a 25
8	.....	94	18	.....	23	28	77	a 24
9	.....	58	19	.....	a 22	29	77	24
10	.....	a 54	20	.....	a 21	30	88	a 24
						31	a 92	.....

a Interpolated.

NOTE.—Discharge determined from a fairly well defined rating curve.

Monthly discharge of Merced River above Illilouette Creek, near Yosemite, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
August 21–31	108	77	93.2	2,030	B.
September	136	20	51.6	3,070	B.
The period	.....	.....	.....	5,100	

Digitized by Google

MERCED RIVER AT HAPPY ISLES BRIDGE, NEAR YOSEMITE, CAL.

LOCATION.—At Happy Isles Bridge, just below power house, 1½ miles southeast of Yosemite, Mariposa County.

DRAINAGE AREA.—181 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 23 to September 30, 1915.

GAGE.—Vertical staff fastened to downstream side of large boulder which is used for right abutment of bridge; read twice a day by Pettis and Jenkins.

DISCHARGE MEASUREMENTS.—Made from Clark Bridge about half a mile below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of boulders; probably permanent. Banks high and not subject to overflow.

WINTER FLOW.—Possibly slightly affected by ice.

DIVERSIONS.—None.

REGULATION.—Power plant above station; water returned to river just above gage.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Mean daily gage heights determined from two readings a day may be somewhat in error owing to operation of power plant which causes diurnal fluctuation especially during low water. Results good.

COOPERATION.—Gage-height record furnished by officials of Yosemite National Park.

Discharge measurements of Merced River at Happy Isles Bridge, near Yosemite, Cal., during the year ending Sept. 30, 1915.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Aug. 20	2.10	110	Sept. 27	1.48	29
23	2.12	116			

Daily discharge, in second feet, of Merced River at Happy Isles Bridge, near Yosemite, Cal., for the year ending Sept. 30, 1915.

Day.	Aug.	Sept.	Day.	Aug.	Sept.	Day.	Aug.	Sept.
1		136	11		51	21		19
2		104	12		42	22		18
3		104	13		40	23	104	18
4		104	14		36	24	104	21
5		97	15		31	25	104	24
6		66	16		28	26	97	24
7		73	17		28	27	90	28
8		66	18		21	28	79	25
9		63	19		21	29	79	24
10		57	20		19	30	83	21
						31	112	

NOTE.—Discharge determined from a well-defined rating curve.

Monthly discharge of Merced River at Happy Isles Bridge, near Yosemite, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
Aug. 23-31	112	79	94.7	1,690	A.
September	136	18	47.0	2,800	A.

Digitized by Google

MERCED RIVER AT YOSEMITE, CAL.

LOCATION.—At Sentinel Bridge, at Yosemite, Mariposa County, in Yosemite National Park, half a mile above mouth of Yosemite Creek, and 1½ miles below mouth of Tenaya Creek.

DRAINAGE AREA.—236 square miles.

RECORDS AVAILABLE.—July, 1904, to June, 1909 (incomplete) and January 4, 1912, to September 30, 1915.

GAGE.—Vertical staff on retaining wall on left bank 3 feet below the bridge; read once a day by J. W. Emmett.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Small boulders and gravel; shifts slightly during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.1 feet, at 9.10 p. m. June 1 (discharge, 4,010 second-feet); minimum stage recorded, 2.20 feet November 29 and 30, and December 2 (discharge, 20 second-feet).

1904–1909 and 1912–1915: Maximum stage recorded, 9.1 feet, at 9.10 p. m., June 1, 1915 (discharge, 4,010 second-feet); minimum stage recorded, 2.25 feet, November 1, 1913 (discharge, 14 second-feet).

WINTER FLOW.—Stage-discharge relation slightly affected by ice.

ACCURACY.—Results good for days on which gage was read. Effect of ice not definitely known but believed to be slight.

COOPERATION.—Gage-height record furnished by officials of Yosemite National Park

Discharge measurements of Merced River at Yosemite, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 6	H. J. Tompkins	2.60	65	July 4	C. P. Firestone	6.10	1,950
Mar. 26	Charles Leidl	3.81	502	24	H. D. McGlashan	4.43	835
26	....do	3.73	470	Aug. 20	Charles Leidl	2.82	114
27	....do	3.60	387	Sept. 27	....do	2.40	38
June 19	C. J. Emerson	6.59	2,130				

Digitized by Google

Daily discharge, in second-feet, of Merced River at Yosemite, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	50	a108	a20	a26	110	112	a462	a705	3,760	1,720	278	113
2	48	130	20	26	132	110	462	630	2,420	1,720	a278	116
3	a46	105	25	a27	a118	110	555	530	1,930	1,720	278	136
4	44	a93	a25	28	105	112	a542	580	2,490	1,880	a265	a123
5	a40	81	a25	a29	a108	120	530	555	2,490	1,260	252	a110
6	36	65	a25	30	110	110	355	580	2,850	1,260	a241	a97
7	a35	56	25	28	a112	a111	355	680	3,000	1,260	a230	84
8	a34	48	23	30	115	112	355	780	3,150	a1,240	a219	68
9	a33	45	26	26	115	112	462	730	3,600	a1,210	208	68
10	33	42	26	a28	a125	a111	508	680	3,000	a1,190	208	a68
11	31	38	28	30	135	110	680	995	1,790	a1,160	201	68
12	28	35	a27	33	135	112	885	1,220	2,420	a1,140	174	a60
13	a27	a34	26	33	135	115	995	a1,050	1,790	a1,120	174	52
14	a26	33	a26	38	a132	138	680	885	1,720	a1,090	a172	a48
15	26	a30	a26	35	130	200	1,050	1,050	1,720	a1,070	a170	a45
16	26	28	26	38	a132	200	755	a1,660	1,790	a1,050	168	a41
17	25	36	26	a41	135	255	995	2,280	1,790	a1,020	145	a38
18	26	a30	29	a44	135	275	a1,290	1,400	1,790	a998	136	34
19	26	25	29	47	135	287	1,590	a1,170	1,790	a974	128	a32
20	33	25	33	a46	135	351	a1,460	940	1,790	a950	119	a31
21	43	a25	30	45	122	a396	1,340	a968	1,720	a926	119	29
22	53	a25	a28	42	110	440	1,100	995	1,790	a902	a122	29
23	48	a25	26	a40	110	a462	940	1,160	1,720	a879	125	29
24	47	25	26	a38	110	485	1,160	1,100	1,720	855	125	34
25	a48	a24	a26	36	110	485	1,220	a1,360	1,790	a733	119	40
26	48	a23	26	35	110	440	2,000	a1,630	1,720	a611	113	40
27	a46	22	a26	45	110	395	3,150	a1,890	1,720	a489	108	40
28	45	a21	26	56	a111	a428	3,300	a2,160	1,720	367	96	a39
29	45	20	26	85	.....	462	830	2,420	1,720	367	93	38
30	65	20	a26	81	.....	a462	780	1,790	1,720	282	103	34
31	a87	.....	26	a96	.....	a462	.....	3,150	.....	a280	108	.....

a No gage height; discharge interpolated.

NOTE.—Discharge determined from two well-defined rating curves, the change occurring July 4. Discharge Sept. 22–26 estimated by comparison with that of South Fork of Merced River at Wawona; flow of the two streams not directly comparable at all seasons. River covered with ice from 1 to 2 inches thick Dec. 12–16 and for a couple of weeks in January; effect on stage-discharge relation considered insignificant.

Monthly discharge of Merced River at Yosemite, Cal., for the year ending Sept. 30, 1915.

[Drainage area, 236 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	.....	25	40.3	0.171	0.20	2,480	C.
November	.....	20	43.9	.186	.21	2,610	C.
December	33	20	26.1	.111	.13	1,600	C.
January	.....	26	40.7	.172	.20	2,500	C.
February	135	105	121	.513	.53	6,720	B.
March	485	110	261	1.11	1.28	16,000	B.
April	3,300	355	1,030	4.36	4.86	61,300	A.
May	3,150	530	1,220	5.17	5.96	75,000	B.
June	3,760	1,720	2,150	9.11	10.16	128,000	A.
July	1,880	280	1,020	4.32	4.98	62,700	C.
August	278	93	170	.720	.83	10,500	B.
September	136	29	59.5	.252	.28	3,540	C.
The year	3,760	20	515	2.18	29.62	373,000	

Digitized by Google

ILLILOUETTE CREEK NEAR YOSEMITE, CAL.

LOCATION.—About 800 feet above mouth, half a mile above power house on Merced River, and 2 miles southeast of Yosemite, Mariposa County.

DRAINAGE AREA.—61.7 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 21 to September 30, 1915.

GAGE.—Vertical enameled staff fastened to a 2-inch by 6-inch timber spiked to a burned stump on left bank; read once a day by an employee of the Yosemite National Park.

DISCHARGE MEASUREMENTS.—Made by wading at gage.

CHANNEL AND CONTROL.—Composed of boulders. Right bank is overflowed at high water, and there are then several channels.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 1.63 feet August 26 and September 2 (discharge, 12 second-feet); minimum stage recorded, 1.23 feet September 21 (discharge, 1.7 second-feet).

WINTER FLOW.—Stage-discharge relation may be affected by ice.

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Results good. This station was established to determine low-water flow only.

COOPERATION.—Gage-height record furnished by officials of Yosemite National Park.

Discharge measurements of Illilouette Creek near Yosemite, Cal., during the year ending Sept. 30, 1915.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Aug. 22	1.63	11	Sept. 26	1.46	5.3
23	1.63	12	27	1.45	5.2

Daily discharge in second-feet of Illilouette Creek near Yosemite, Cal., for the year ending Sept. 30, 1915.

Day.	Aug.	Sept.	Day.	Aug.	Sept.	Day.	Aug.	Sept.
1	.....	a11	11	.....	4.0	21	11	1.7
2	.....	12	12	.....	a4.0	22	a11	2.0
3	.....	10	13	.....	4.0	23	11	2.0
4	.....	8.9	14	.....	a3.9	24	11	a3.7
5	.....	a8.1	15	.....	a3.8	25	11	5.4
6	.....	a7.2	16	.....	3.7	26	12	a5.0
7	.....	6.4	17	.....	a3.1	27	10	a4.7
8	.....	5.4	18	.....	2.5	28	9.3	a4.4
9	.....	5.2	19	.....	a2.2	29	8.9	4.0
10	.....	a4.6	20	.....	a2.0	30	9.3	a3.6
						31	a10	.....

a Interpolated.

NOTE.—Discharge determined from a well-defined rating curve.

Digitized by Google

Monthly discharge of Illilouette Creek near Yosemite, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
Aug. 21-31	12	8.9	10.4	227	B.
September	12	1.7	4.95	295	B.

TENAYA CREEK NEAR YOSEMITE, CAL.

LOCATION.—At Tenaya Bridge, in Yosemite National Park, five-eighths mile below outlet of Mirror Lake, five-eighths mile above junction with Merced River and 1¼ miles east of Yosemite, Mariposa County.

DRAINAGE AREA.—47 square miles.

RECORDS AVAILABLE.—July, 1904, to June, 1909 (incomplete); January 5, 1912, to September 30, 1915.

GAGE.—Vertical staff fastened to left abutment near downstream end; read once a day irregularly by J. W. Emmett. Original staff gage was fastened to upstream side of bridge 9 feet from left abutment. About December 1, 1912, a new staff gage was installed at new datum on upstream side of bridge near right abutment. This gage was removed and the present gage installed February 4, 1913. Present gage datum is 0.55 foot higher than previous datum.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Small boulders and gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.85 feet at 6 p. m. May 31 (discharge, 1,120 second-feet); minimum stage recorded, 1.20 feet at 10 a. m. September 7 (discharge, 0.9 second-foot).

1904–1909 and 1912–1915: Maximum stage recorded, 8.1 feet June 16, 1906 (discharge, 1,280 second-feet); minimum stage recorded, 2.9 feet September 12 and most of October, 1906 (discharge, 0.5 second-foot). Relation between datum of gage used in 1906 and that of the present gage unknown.

WINTER FLOW.—Stage discharge relation probably slightly affected by ice some winters, but not in 1914–15.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Rating curve well defined except for extremely low water; gage-height record fragmentary; results fair.

COOPERATION.—Gage-height record furnished by officials of the Yosemite National Park.

Discharge measurements of Tenaya Creek near Yosemite, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 6	H. J. Tompkins	1.50	7.8	July 3	C. P. Firestone	3.20	205
Mar. 26	Charles Leidl	2.91	130	24	H. D. McGlashan	2.29	55
27	do	2.78	110	Aug. 20	CharlesLeidl	1.37	4.3
June 19	C. J. Emerson	3.88	383	Sept. 27	do	1.32	2.4

Digitized by Google

Daily discharge, in second-feet, of Tenaya Creek near Yosemite, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	a 2.1	a 19	2.4	a 4.6	33	a 34	a 110	a 285	775	a 260	95	a 2.6
2	a 2.1	15	a 3.5	4.6	33	a 34	117	a 211	a 938	246	a 56	2.8
3	a 2.1	15	4.6	a 5.0	a 29	34	113	137	1,100	259	17	2.4
4	a 2.1	12	a 4.4	5.5	26	34	a 122	a 142	775	a 251	12	2.4
5	a 2.1	a 10	4.2	a 6.2	a 28	33	131	a 138	735	a 170	11	a 1.9
6	a 2.1	7.6	a 4.2	7.0	a 30	a 33	a 116	a 142	775	a 170	a 10	a 1.4
7	2.1	7.0	4.2	a 7.2	33	33	100	197	a 785	a 170	9.6	.9
8	a 2.1	6.1	a 4.2	a 7.4	a 33	34	a 100	a 242	a 795	a 163	a 8.6	4.6
9	a 2.1	4.9	a 4.2	7.6	a 33	a 33	101	a 214	a 805	a 156	7.6	3.7
10	2.1	4.6	4.2	a 7.6	33	32	a 143	a 197	815	a 149	8.0	a 3.0
11	a 2.1	4.6	a 4.3	a 7.6	a 36	27	a 186	a 330	a 658	a 142	a 6.1	2.4
12	a 2.1	4.6	a 4.4	7.6	a 40	33	a 229	420	502	a 135	a 4.2	a 2.6
13	a 2.1	4.6	4.6	a 8.6	44	a 37	272	330	a 476	a 128	2.4	2.8
14	2.1	a 5.4	a 4.6	9.6	a 42	a 42	197	246	450	a 121	5.2	a 2.6
15	2.1	a 6.2	4.6	a 9.6	40	47	a 298	a 298	a 468	a 114	a 5.8	a 2.5
16	2.1	7.0	a 4.6	a 9.6	44	60	246	a 435	485	a 107	27	2.4
17	2.1	a 6.0	4.6	a 9.6	47	74	a 268	572	a 460	a 100	a 15	a 2.8
18	2.1	a 5.1	a 4.6	9.6	47	72	390	390	435	a 93	4.4	3.3
19	2.1	4.2	4.6	a 10	47	85	a 450	a 309	390	a 86	4.2	a 3.0
20	2.4	a 3.3	a 4.6	a 11	44	112	450	a 228	420	a 79	3.9	a 2.7
21	3.5	2.4	4.6	a 11	40	a 120	a 400	a 249	a 408	a 72	3.7	2.4
22	4.2	a 2.4	a 4.8	12	40	129	300	a 270	a 397	a 66	a 3.6	a 2.4
23	6.1	2.4	a 5.0	12	36	a 146	330	330	a 386	a 60	3.5	a 2.4
24	7.6	a 2.4	5.2	12	36	162	a 330	a 342	375	54	3.5	a 2.5
25	7.0	2.4	a 5.0	a 12	33	162	a 288	a 355	345	a 47	3.3	a 2.6
26	a 6.2	a 2.4	a 4.8	a 12	33	131	246	468	330	a 40	3.3	a 2.7
27	5.5	a 2.4	4.6	15	a 34	85	234	735	a 316	33	3.3	2.8
28	a 5.8	2.4	a 4.6	a 19	34	a 108	a 276	775	a 302	26	2.8	a 2.8
29	6.1	a 2.2	4.6	a 24	.....	131	a 318	815	a 288	24	2.8	2.8
30	a 32	2.1	a 4.6	24	.....	98	360	735	a 274	a 22	2.8	a 2.8
31	a 25	.....	a 4.6	a 28	.....	a 104	.....	895	.....	a 68	2.4	.....

a Estimated by interpolation or by comparison with records of flow of Merced River at Yosemite and Yosemite Creek at Yosemite.

NOTE.—Discharge determined from a rating curve well defined above 6 second-feet.

Monthly discharge of Tenaya Creek near Yosemite, Cal., for the year ending Sept. 30, 1915.

[Drainage area, 47 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	32	2.1	4.88	0.104	0.12	300	D.
November	19	2.1	5.86	.125	.14	349	C.
December	5.2	2.4	4.45	.095	.11	274	C.
January	28	4.6	10.9	.232	.27	670	C.
February	47	26	36.7	.781	.81	2,040	B.
March	162	27	74.2	1.58	1.82	4,560	B.
April	450	100	241	5.13	5.72	14,300	B.
May	895	137	369	7.85	9.05	22,700	C.
June	1,110	274	549	11.7	13.06	32,700	B.
July	260	22	116	2.47	2.85	7,130	
August	95	2.4	11.2	.238	.27	689	C.
September	4.6	.9	2.63	.056	.06	156	C.
The year	1,100	.9	119.0	2.53	34.28	85,900	

Digitized by Google

YOSEMITE CREEK AT YOSEMITE, CAL.

LOCATION.—At highway bridge in Yosemite National Park, one-fourth mile northwest of Yosemite, Mariposa County, and half a mile above junction with Merced River.

DRAINAGE AREA.—43.2 square miles (measured on topographic maps).

RECORDS AVAILABLE.—July, 1904, to June, 1909 (incomplete), and January 4, 1912, to September 30, 1915.

GAGE.—Staff in two sections; upper section, vertical, fastened to left abutment near downstream end; lower, inclined, fastened to boulder in front of upper section; read once a day, irregularly, by J. W. Emmett. Original staff gage was on tree on right bank 50 feet above bridge. January 4, 1912, new staff gage was installed on tree on right bank 25 feet above bridge at approximately same datum. Present gage was installed February 5, 1913, at datum 3.04 feet higher than that of gages previously used.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Composed of fine gravel and sand; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and periods 1904–1909 and 1912–1915: 8.5 feet at 6.30 p. m. June 8 (discharge, 1,500 second-feet; determined from extension of rating curve and may be subject to error); minimum stage recorded, 2.50 feet at 9.15 a. m. September 9 when there was no flow past the gage.

WINTER FLOW.—Stage-discharge relation slightly affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Rating curves well defined but gage-height record is fragmentary; results fair.

COOPERATION.—Gage-height record furnished by officials of Yosemite National Park.

Discharge measurements of Yosemite Creek at Yosemite, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 6	H. J. Tompkins.....	2.80	1.8	July 4	C. P. Firestone.....	4.09	166
Mar. 26	Charles Leidl.....	3.76	94	24	H. D. McGlashan.....	3.08	25
27	.....do.....	3.65	75	Aug. 21	Charles Leidl.....	2.70	1.6
June 19	Lasley Lee.....	4.76	298	Sept. 27	.....do.....	2.68	.4

Digitized by Google

Daily discharge, in second-feet, of Yosemite Creek at Yosemite, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept
1	1.1	12	1.1	a 1.1	a 8.1	a 8.4	83	184	950	a 160	11.0	0.7
2	1.1	a 7.5	a 1.2	1.1	8.1	8.1	107	507	750	a 160	a 10	.8
3	1.1	3.0	a 1.3	a 1.1	a 8.6	14	132	325	800	a 160	9.8	.2
4	a 1.1	a 3.0	1.3	1.1	9.0	4.5	a 111	a 237	700	167	9.8	a. 2
5	a 1.1	3.0	a 1.3	a 1.4	a 9.0	14	a 90	149	700	a 108	5.0	a. 2
6	a 1.1	3.6	1.3	1.5	a 9.0	a 14	69	124	675	a 108	a 5.0	a. 2
7	a 1.1	2.4	a 1.1	1.3	9.0	14	a 76	149	950	a 108	5.0	.2
8	a 1.1	1.5	a. 9	a 1.2	a 10	14	83	149	1,180	a 103	a 4.8	.2
9	a 1.1	1.5	.7	1.1	a 11	a 14	83	202	780	a 98	4.6	.0
10	1.1	1.3	1.0	a 1.1	12	a 13	a 151	a 242	384	a 93	a 4.4	.6
11	1.0	1.2	1.1	a 1.1	12	12	220	281	650	a 88	4.2	1.1
12	1.0	1.3	a. 9	1.1	3.0	12	220	507	586	a 83	a 3.9	a. 9
13	a 1.0	a 1.4	.7	1.6	3.9	23	220	260	494	a 78	a 3.7	.7
14	a 1.0	1.5	a. 6	2.1	12	19	211	211	264	a 73	a 3.5	a. 7
15	1.0	a 1.5	.5	1.3	a 16	28	166	325	167	a 68	a 3.3	a. 7
16	1.0	1.5	.5	a 1.3	19	43	325	a 502	167	a 63	3.1	a. 7
17	1.0	1.5	1.1	a 1.4	19	55	369	a 680	351	a 58	a 2.7	a. 7
18	a 1.0	.4	a 1.1	a 1.4	9.0	69	347	a 450	351	a 53	2.3	.7
19	1.0	.5	a 1.1	1.5	15	83	303	220	167	a 48	1.6	a. 7
20	a 3.1	1.1	1.1	a 1.5	9.0	83	a 292	211	167	a 43	2.0	a. 7
21	6.8	1.1	a 1.1	1.5	9.0	a 108	281	184	149	a 38	2.0	a. 8
22	11	a 1.1	1.1	3.9	9.0	132	220	347	167	a 34	1.2	a. 8
23	9.0	1.1	a 1.1	1.1	a 7.9	149	a 272	260	167	a 30	2.0	a. 8
24	9.0	a 1.1	a 1.1	a 1.1	6.8	140	325	325	167	26	2.3	a. 9
25	a 6.0	a 1.1	1.1	a 1.2	6.8	91	a 303	369	167	a 24	1.6	a. 9
26	3.0	a 1.1	a 1.1	1.3	7.6	69	a 281	651	149	a 22	1.2	a. 9
27	a 3.0	1.1	1.1	a 2.9	9.0	76	260	900	167	a 20	1.1	1.0
28	3.0	a 1.1	a 1.1	4.5	a 8.7	a 76	a 240	950	167	18	2.3	.5
29	3.9	1.1	1.1	8.1	.....	76	220	800	149	5.0	1.2	a. 5
30	25	a 1.1	a 1.1	a 8.1	.....	a 78	a 202	850	149	a 7.0	.8	a. 5
31	a 18	.....	1.1	a 8.1	.....	a 80	.....	a 900	.....	a 9.0	.7	.....

a Estimated by interpolation or by comparison with records of flow of Merced River at Yosemite and Tenaya Creek near Yosemite.

NOTE.—Discharge determined from two rating curves, as follows: Oct. 1 to June 7, fairly well defined; and June 8 to Sept. 30, well defined between 4 and 700 second-feet.

Monthly discharge of Yosemite Creek at Yosemite, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	25	1.0	3.90	240	
November	12	.4	2.06	123	
December	1.3	.5	1.03	63	
January	8.1	1.1	2.20	135	
February	19	3.0	9.88	549	C.
March	149	4.5	52.3	3,220	B.
April	369	69	209	12,400	B.
May	950	124	402	24,700	B.
June	1,180	149	428	25,500	A.
July	167	5.0	69.5	4,270	
August	11	.7	3.75	231	D.
September	1.1	.0	.62	37	
The year	1,180	.0	98.7	71,500	

Digitized by Google

SOUTH FORK OF MERCED RIVER NEAR WAWONA, CAL.

LOCATION.—In the SE. ¼ sec. 33, T. 4 S., R. 21 E., opposite United States military camp in Sierra National Forest, and 1 mile below Wawona, Mariposa County. Big Creek enters half a mile above and Rush Creek three-fourths of a mile below the station.

DRAINAGE AREA.—131 square miles (measured on topographic maps).

RECORDS AVAILABLE.—December 15, 1910, to September 30, 1915.

GAGE.—Vertical staff fastened to an alder tree on left bank, read once a day by A. C. Leonard. It was installed August 22, 1911, and is 250 feet below the site of original gage, which was a vertical staff fastened to the center pier of the footbridge that was destroyed by high water January 30, 1911. Original datum not maintained.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.0 feet at 6 p. m., June 8 (discharge, 2,500 second-feet); minimum stage recorded, 1.9 feet, September 17 to 23 and 27 to 30 (discharge, 5 second-feet).

1910–1915: Maximum stage recorded, 7.2 feet, January 26 and February 19 and 20, 1914 (discharge, 3,770 second-feet); minimum stage recorded, 1.8 feet, October 14, 19, 20, 22, and 23, 1912 (discharge, 8 second-feet). A miscellaneous measurement made September 24, 1910, indicated a flow of 2.6 second-feet.

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—The ranch of the Wawona Co. is irrigated from a tributary above the station.

REGULATION.—None.

ACCURACY.—Results good.

COOPERATION.—Station maintained in cooperation with United States Forest Service. Gage-height record furnished by A. C. Leonard, park ranger.

Discharge measurements of South Fork of Merced River near Wawona, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Nov. 7	H. J. Tompkins	2.20	23
July 26	H. D. McGlashan	2.61	82

Digitized by Google

Daily discharge, in second-feet, of South Fork of Merced River near Wawona, Cal., for the year ending Sept. 30, 1915.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	23	28	330	805	80	545	1,360	2,000	485	45	15
2	23	28	330	735	80	545	1,280	2,000	430	45	15
3	23	33	380	605	60	545	1,360	1,540	380	45	15
4	23	60	380	485	60	545	1,280	1,190	285	45	15
5	23	60	380	380	80	485	1,280	2,300	244	45	8.5
6	23	60	430	285	80	485	1,360	1,540	244	45	8.5
7	23	60	430	204	80	485	1,360	1,620	204	45	8.5
8	23	80	430	204	104	545	1,280	2,500	204	33	8.5
9	23	80	430	201	104	545	1,190	1,720	204	33	8.5
10	23	80	430	244	104	545	1,110	1,720	204	33	8.5
11	23	80	485	244	133	805	1,110	1,540	204	33	8.5
12	23	104	485	244	133	875	1,190	1,110	166	23	8.5
13	23	104	485	244	133	950	1,280	1,540	166	23	8.5
14	23	104	485	285	133	950	1,190	1,540	166	23	8.5
15	23	133	485	330	133	875	1,620	1,720	166	23	8.5
16	23	133	485	380	133	1,030	1,720	1,540	166	23	8.5
17	23	133	485	204	244	1,030	1,620	1,540	166	23	5
18	23	166	485	133	285	1,110	1,720	1,440	133	23	5
19	23	166	485	166	330	1,110	1,810	1,110	133	23	5
20	23	166	485	45	430	1,190	1,720	1,280	133	23	5
21	23	166	485	45	430	1,190	1,110	1,360	104	23	5
22	23	204	545	45	485	1,190	735	1,190	104	23	5
23	23	244	545	45	485	1,190	805	1,110	104	23	5
24	23	244	605	60	545	1,280	950	950	104	23	8.5
25	23	285	605	60	545	1,280	670	670	80	23	8.5
26	23	285	605	60	545	1,190	805	605	80	15	8.5
27	23	285	670	60	605	1,190	1,440	545	60	15	5
28	23	285	805	80	605	1,280	1,720	545	60	15	5
29	23	285	875	.....	605	1,360	1,620	485	45	15	5
30	23	285	950	.....	545	1,280	1,360	430	45	15	5
31	.....	285	950	.....	545	.....	2,300	.....	45	15	.....

NOTE.—Discharge determined from a rating curve well defined between 10 and 2,200 second-feet. Discharge, Nov. 1–6, estimated. Mean discharge for October estimated at 19 second-feet.

Monthly discharge of South Fork of Merced River near Wawona, Cal., for the year ending Sept. 30, 1915.

[Drainage area, 131 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	.....	.....	[a] 19	0.145	0.17	1,170
November	23	23	23.0	.176	.20	1,370
December	285	28	152	1.16	1.34	9,350
January	950	330	530	4.05	4.67	32,600
February	805	45	246	1.88	1.96	13,700
March	605	60	286	2.18	2.51	17,600
April	1,360	485	921	7.03	7.84	54,800
May	2,300	670	1,330	10.2	11.76	81,800
June	2,500	430	1,350	10.3	11.49	80,300
July	485	45	171	1.31	1.51	10,500
August	45	15	27.7	.211	.24	1,700
September	15	5	8.08	.062	.07	481
The year	2,500	.....	422	3.22	43.76	305,000

[a] Estimated.

Digitized by Google

TUOLUMNE RIVER AT HETCH HETCHY CABIN, NEAR SEQUOIA, CAL.

LOCATION.—Near east line of sec. 10, T. 1 N., R. 20 E., in Hetch Hetchy Valley, in Yosemite National Park, half a mile above junction with Falls Creek, 2 miles above Hetch Hetchy dam site, 12 miles by trail from Hog Ranch (Portulaca), and about 12½ miles northeast of Sequoia, Tuolumne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1910 to September 30, 1915.

GAGE.—Lietz water-stage recorder on left bank 250 feet below Hetch Hetchy cabin.

DISCHARGE MEASUREMENTS.—Made from cable 25 feet upstream from gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel; fairly permanent. Both banks high but subject to overflow in extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 12.03 feet at 12 p. m. May 31 (discharge, determined from extension of rating curve, 7,580 second-feet); minimum stage, from water-stage recorder, 0.04 foot from 4 to 10 a. m. December 1 (discharge, 25 second-feet).

1910–1915: Maximum stage recorded, 14.52 feet, June 18, 1911 (discharge, 9,250 second-feet); minimum stage recorded, 0.60 foot December 24 and 25, 1911 (discharge 14 second-feet).

WINTER FLOW.—Stage-discharge relation at times affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Results good.

Discharge measurements of Tuolumne River at Hetch Hetchy cabin, near Sequoia, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 6	Lasley Lee	0.29	48	May 8	C. J. Emerson	4.10	1,310
14	do	.16	33	31	do	9.22	5,110
Nov. 26	do	.12	31	June 1	do	10.35	5,840
30	W. V. Hardy	.08	28	2	do	8.52	4,620
Dec. 29	do	.22	36	3	do	7.52	3,760
Jan. 8	do	.32	52	4	do	6.90	3,300
18	do	.67	92	24	do	7.32	3,580
27	do	.58	85	July 12	do	5.55	2,320
28	do	.95	148	15	do	4.35	1,420
Feb. 25	C. J. Emerson	1.33	239	18	Lasley Lee	3.75	1,110
Mar. 2	do	1.40	245	24	do	4.06	1,280
18	do	2.54	568	27	do	2.79	654
31	do	2.38	501	28	do	2.50	518
Apr. 12	do	4.24	1,310	29	do	2.23	435
17	do	4.57	1,530	Aug. 4	C. J. Emerson	1.70	316
19	do	5.60	2,240	12	do	1.21	188
20	do	5.98	2,550	16	do	1.10	162
22	do	4.91	1,780	21	do	.86	120
May 1	do	3.53	987	Sept. 21	Lasley Lee	.13	31
3	do	3.08	773				

Digitized by Google

Daily discharge, in second-feet, of Tuolumne River at Hetch Hetchy cabin, near Sequoia, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	70	159	29	44	264	268	675	1,020	6,400	3,510	315	129
2	67	190	33	45	280	250	848	892	5,110	3,510	312	134
3	61	150	38	48	196	252	1,020	825	4,310	3,350	318	134
4	57	128	46	56	190	254	965	915	3,590	3,110	315	136
5	52	113	44	56	190	261	758	965	4,070	2,630	290	120
6	49	102	43	57	202	250	615	1,040	5,190	1,840	266	108
7	48	92	45	52	184	236	635	1,200	5,860	1,700	243	96
8	48	84	40	55	292	221	575	1,280	6,310	1,840	232	91
9	47	77	36	52	330	221	695	1,170	6,220	2,120	228	85
10	46	72	46	56	288	208	990	1,250	5,950	2,190	219	80
11	45	67	45	61	254	210	1,280	2,190	4,950	2,400	210	77
12	43	62	44	61	210	223	1,460	2,400	3,670	2,260	200	67
13	40	60	42	69	214	228	1,520	1,980	3,270	1,910	178	61
14	38	58	44	102	232	310	1,090	1,490	3,670	1,700	172	58
15	36	56	49	72	247	396	1,060	1,700	4,150	1,400	170	52
16	33	51	52	67	320	488	1,310	2,470	4,310	1,250	170	50
17	32	50	51	69	437	558	1,840	3,670	3,990	1,170	165	46
18	32	48	48	68	338	595	2,190	2,400	3,990	1,020	152	42
19	45	44	51	69	300	615	2,400	1,840	3,830	915	141	36
20	84	40	50	75	271	655	2,470	1,520	3,510	940	134	37
21	124	36	47	75	234	758	2,120	1,400	3,670	1,040	129	36
22	110	35	47	72	232	825	1,770	1,640	3,910	1,310	124	36
23	110	36	47	66	219	915	1,580	1,910	3,990	1,490	129	36
24	110	37	46	66	221	940	1,490	2,050	3,830	1,430	138	37
25	105	36	48	69	225	915	1,400	1,640	3,430	1,040	141	42
26	102	35	47	68	234	735	1,280	2,120	2,870	848	129	48
27	104	31	45	87	247	595	1,310	3,670	3,110	655	118	52
28	102	35	43	138	288	825	1,520	4,550	3,430	540	108	54
29	102	38	43	204	.....	780	1,400	4,470	3,590	455	105	51
30	192	31	44	163	.....	615	1,200	5,110	3,430	410	113	45
31	178	.....	45	168	.....	540	.....	5,680	.....	354	115	.....

NOTE.—Discharge determined from a rating curve well defined between 255 and 5,500 second-feet and fairly well defined below 255 second-feet. Control frozen over on cold nights but ice melted during the day; amount of backwater due to ice was fairly well known and gage-height graph was corrected.

Monthly discharge of Tuolumne River at Hetch Hetchy cabin, near Sequoia, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	192	32	74.6	4,590	B.
November	190	31	68.4	4,070	B.
December	52	29	44.5	2,740	B.
January	204	44	77.7	4,780	B.
February	437	184	255	14,200	B.
March	940	208	488	30,000	A.
April	2,470	575	1,320	78,600	A.
May	5,680	825	2,140	132,000	A.
June	6,400	2,870	4,250	253,000	A.
July	3,510	354	1,620	99,600	A.
August	318	105	186	11,400	A.
September	136	36	69.2	4,120	B.
The year	6,400	29	883	639,000	

Digitized by Google

TUOLUMNE RIVER AT HETCH HETCHY DAM SITE, NEAR SEQUOIA, CAL.

LOCATION.—In the NW. ¼ sec. 16, T. 1 N., R. 20 E., in Yosemite National Park, at dam site at lower end of Hetch Hetchy Valley, 1½ miles below junction with Falls Creek, and about 11 miles northeast of Sequoia, Tuolumne County.

DRAINAGE AREA.—459 square miles.[1]

RECORDS AVAILABLE.—December 1, 1910 to August 31, 1915 (not complete), when station was discontinued.

GAGE.—Lietz water-stage recorder on left bank at dam site.

DISCHARGE MEASUREMENTS.—Made from car and cable 50 feet upstream from gage, or by wading.

CHANNEL AND CONTROL.—The bed of channel, composed of fine sand and gravel shifts. Control, composed of boulders, shifted a little but was fairly satisfactory until construction began. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 21.65 feet from 3 to 4 a. m. June 1 (discharge, 8,960 second-feet); minimum stage from water-stage recorder, −0.60 foot at 12 m. December 1 (discharge, 33 second-feet).

1911–1915: Maximum stage recorded, 24.8 feet June 18, 1911 (discharge, 11,400 second-feet); minimum discharge, 17 second-feet December 24 and 25, 1911.

WINTER FLOW.—Stage-discharge relation slightly affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Natural shifts in control during the fall and artificial shifts due to construction work at the dam site were so numerous that the station was discontinued; changes in control fairly well covered by current-meter measurements· results good.

Discharge measurements of Tuolumne River at Hetch Hetchy dam site, near Sequoia, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 26	Lasley Lee	−0.50	39	Apr. 19	C. J. Emerson	12.45	2,810
30	W. V. Hardy	− .52	34	20	....do	13.06	3,100
Dec. 25	....do	− .07	60	22	....do	11.05	2,120
Jan. 8	....do	.05	64	28	....do	10.20	1,830
18	....do	.52	113	May 3	....do	7.26	913
22	....do	.25	93	10	....do	8.95	1,400
27	....do	.28	98	24	....do	12.22	2,710
27	....do	.44	113	31	....do	17.85	5,800
28	....do	1.26	213	June 4	....do	14.41	3,790
28	....do	1.19	198	10	....do	18.15	6,220
29	....do	2.42	325	25	....do	14.60	3,970
Feb. 15	....do	2.52	362	July 8	....do	10.99	2,120
21	C. J. Emerson	2.34	333	17	Lasley Lee	9.20	1,510
25	....do	2.20	315	18	....do	8.50	1,260
27	....do	4.50	326	24	....do	10.85	2,110
Mar. 1	....do	4.65	365	26	....do	7.95	1,100
3	....do	4.48	347	27	....do	6.93	793
8	....do	3.34	307	28	....do	6.24	676
17	....do	5.89	687	29	....do	5.71	558
22	....do	7.30	989	Aug. 2	C. J. Emerson	4.66	384
24	....do	8.14	1,190	9	....do	3.90	261
30	....do	6.33	760	17	....do	1.04	185
Apr. 8	....do	6.07	720	21	....do	.37	146
13	....do	10.20	1,920	28	....do	.40	121
14	....do	8.36	1,260	Sept. 2	....do	.83	149
17	....do	10.29	1,910				

[1] Freeman, J. R., The Hetch Hetchy water supply for San Francisco, p. 24, 1912.

Digitized by Google

Daily discharge, in second-feet, of Tuolumne River at Hetch Hetchy dam site, near Sequoia, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	88	212	35	52	383	374	820	1,300	7,830	4,250	416
2	85	242	38	55	395	350	1,000	1,130	6,790	4,190	384
3	81	175	42	60	266	350	1,260	1,060	5,390	4,030	384
4	78	139	50	70	250	350	1,260	1,160	4,310	3,710	384
5	75	117	48	68	260	362	980	1,200	4,890	3,290	352
6	72	101	50	69	276	350	798	1,300	6,130	2,260	336
7	69	90	52	65	260	368	798	1,480	7,310	2,000	320
8	69	81	48	67	359	313	758	1,600	7,830	2,170	304
9	68	73	46	65	461	313	864	1,440	7,830	2,530	276
10	67	70	57	68	398	294	1,200	1,540	7,030	2,630	262
11	64	67	56	70	362	303	1,540	2,740	6,150	2,830	254
12	62	63	53	68	322	323	1,810	3,080	4,490	2,730	215
13	60	61	49	77	322	323	1,960	2,690	4,010	2,260	190
14	56	58	52	120	339	420	1,380	1,850	4,370	2,120	180
15	53	56	62	97	374	526	1,320	2,010	5,090	1,740	180
16	50	52	56	96	437	626	1,560	2,830	5,270	1,560	190
17	48	50	58	96	585	698	2,200	4,670	4,910	1,460	190
18	47	48	58	96	465	758	2,740	2,980	4,910	1,260	180
19	55	45	65	95	411	778	3,080	2,240	4,790	1,110	170
20	120	42	60	100	386	820	3,180	1,840	4,310	1,140	155
21	161	40	59	104	339	955	2,780	1,640	4,370	1,170	145
22	138	38	55	95	334	1,060	2,240	1,780	4,790	1,670	145
23	134	38	55	87	322	1,160	2,040	2,350	4,850	1,920	145
24	140	39	61	85	322	1,200	1,840	2,640	4,670	1,880	150
25	136	39	59	88	328	1,200	1,740	2,080	4,250	1,360	155
26	138	37	58	85	339	1,000	1,560	2,460	3,530	1,080	125
27	141	37	58	100	350	798	1,560	4,190	3,730	816	125
28	142	39	55	210	398	1,060	1,920	5,490	4,190	680	120
29	144	42	54	282	.....	1,000	1,780	5,490	4,370	578	120
30	284	38	54	230	.....	820	1,560	5,910	4,250	504	125
31	290	.....	53	240	.....	718	.....	6,590	.....	450	130

NOTE.—Discharge determined from nine rating curves, mostly well defined, applicable for short periods. Discharge Oct. 4 interpolated; Jan. 16–18, Feb. 26, May 14–16, 22, 23, 27–31, June 5–9, July 2–6, and 8–13 estimated, because there was no record, by comparison with record of flow for the station below the dam site.

Monthly discharge of Tuolumne River at Hetch Hetchy dam site, near Sequoia, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	290	47	104	6,400	A.
November	242	37	74.3	4,420	A.
December	65	35	53.4	3,280	A.
January	282	52	102	6,270	A.
February	585	250	359	19,900	A.
March	1,200	294	644	39,600	A.
April	3,180	758	1,650	98,200	A.
May	6,590	1,060	2,610	160,000	B.
June	7,830	3,530	5,220	311,000	B.
July	4,250	450	1,980	122,000	B.
August	416	120	221	13,600	B.
The period	.....	.....	.....	785,000	

Digitized by Google

TUOLUMNE RIVER BELOW HETCH HETCHY DAM SITE, NEAR SEQUOIA, CAL.

LOCATION.—In the SW. ¼ SE. ¼ sec. 17, T. 1 N., R. 20 E., in Yosemite National Park about three-fourths mile below Hetch Hetchy dam site and about 11 miles northeast of Sequoia, Tuolumne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 20, 1914, to September 30, 1915. This station was established to take the place of the station at the dam site when it became necessary to discontinue that station on account of construction.

GAGE.—Gurley weight-driven, printing water-stage recorder on left bank. Difference in elevation between the zero of this gage and that of the gage at the dam site is 53.15 feet.

DISCHARGE MEASUREMENTS.—Made from cable 30 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed of channel composed of boulders; control of boulders and solid rock, both permanent. Channel at measuring section smoothed off by removing some boulders. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during period of records, from water-stage recorder, 12.55 feet at 4 a. m. June 1 (discharge, 9,040 second-feet); minimum stage from water-stage recorder, 1.60 feet September 22 and 23 (discharge, 36 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Conditions favorable for excellent results, but gage stopped during parts of January, February, March and July; daily discharge for these periods was estimated from records of flow for the dam-site station. Results good.

Discharge measurements of Tuolumne River below Hetch Hetchy dam site, near Sequoia, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 24	W. V. Hardy	1.64	37	Apr. 1	C. J. Emerson	6.21	827
30	do	1.60	48	8	do	6.00	763
Dec. 25	do	2.12	66	12	do	7.98	1,640
Jan. 8	do	2.22	68	20	do	9.42	2,990
20	do	2.66	102	22	do	8.55	2,120
22	do	2.52	87	May 10	do	7.52	1,340
25	do	2.45	78	25	do	8.35	1,920
28	do	3.40	191	June 1	do	11.58	6,630
Feb. 13	do	4.14	297	5	do	10.33	4,110
14	do	4.14	318	30	do	10.11	3,760
23	C. J. Emerson	4.10	323	July 7	do	8.46	2,020
Mar. 8	do	4.09	322	25	do	7.53	1,340
15	do	5.10	507	Aug. 7	do	4.07	330
16	do	5.48	602	12	do	3.52	232
17	do	5.79	679	20	do	2.96	156
22	do	6.61	946	30	do	2.70	133
23	do	7.14	1,180	Sept. 21	Lasley Lee	1.62	36

NOTE.—Not much weight was given to the first nine measurements because standard soundings were used in making them.

Digitized by Google

Daily discharge, in second-feet, of Tuolumne River below Hetch Hetchy dam site, near Sequoia, Cal., for the year ending Sept. 30, 1915.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	57	398	377	825	1,280	7,830	4,350	395	142
2	.....	60	410	359	1,010	1,090	7,070	4,190	377	153
3	.....	62	286	359	1,280	1,010	5,490	4,030	377	150
4	.....	75	270	361	1,280	1,090	4,350	3,710	386	153
5	.....	76	278	373	1,010	1,180	4,890	3,290	342	135
6	.....	77	294	361	790	1,230	6,130	2,260	326	115
7	.....	72	270	381	825	1,450	7,310	2,090	318	103
8	.....	74	367	326	760	1,570	7,830	2,170	294	96
9	.....	71	469	318	860	1,390	7,830	2,530	270	90
10	.....	70	406	302	1,180	1,510	7,070	2,630	262	82
11	.....	81	368	310	1,510	2,730	6,130	2,830	254	75
12	.....	78	326	329	1,780	3,050	4,350	2,730	240	67
13	.....	88	326	329	1,930	2,630	3,870	2,260	219	59
14	.....	130	342	426	1,390	1,850	4,350	2,090	205	55
15	.....	107	374	530	1,330	2,010	5,090	1,740	205	52
16	.....	106	437	644	1,570	2,830	5,290	1,560	205	50
17	.....	106	585	730	2,260	4,530	4,890	1,450	191	46
18	.....	106	465	760	2,730	2,930	4,890	1,230	178	43
19	.....	105	411	790	3,050	2,170	4,890	1,090	160	40
20	71	110	386	820	3,170	1,780	4,350	1,090	152	38
21	63	114	339	955	2,730	1,570	4,530	1,170	146	37
22	65	105	334	1,050	2,260	1,780	4,890	1,670	143	36
23	62	95	322	1,130	2,010	2,350	4,890	1,930	142	36
24	68	94	318	1,180	1,850	2,630	4,710	1,930	150	37
25	70	99	326	1,230	1,710	2,090	4,190	1,330	158	41
26	70	96	334	1,050	1,570	2,350	3,570	1,050	142	48
27	67	115	350	825	1,510	4,190	3,710	790	126	50
28	64	225	398	1,050	1,930	5,490	4,190	640	116	49
29	60	297	.....	1,050	1,780	5,490	4,350	540	113	48
30	59	245	.....	860	1,510	5,910	4,190	490	120	46
31	61	255	.....	730	.....	6,590	.....	440	124	.....

NOTE.—Discharge, except as noted below, determined from a well-defined rating curve. Discharge Jan. 1, 2, 14-22, 27-31, Feb. 1, 2, 8-10, 15-23, 28, Mar. 3-7, 12-14, 16, 20, 21, July 15, 16, 21 and 22 estimated by comparison with records obtained at the dam site.

Monthly discharge of Tuolumne River below Hetch Hetchy dam site, near Sequoia, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
December 20-31	71	59	65.0	1,550	B.
January	297	57	111	6,830	B.
February	585	270	364	20,200	B.
March	1,230	302	655	40,300	B.
April	3,170	760	1,650	98,200	A.
May	6,590	1,010	2,570	158,000	A.
June	7,830	3,570	5,240	312,000	A.
July	4,350	440	1,980	122,000	A.
August	395	113	221	13,600	A.
September	153	36	72.4	4,310	B.
The period	.....	.....	.....	777,000	

TUOLUMNE RIVER NEAR GROVELAND, CAL.

LOCATION.—In the SW. ¼ sec. 24, T. 1 S., R. 17 E., 1 mile below junction with South Fork of Tuolumne River, and about 9 miles east of Groveland, Tuolumne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 2, 1907, to September 30, 1915 (not complete).

GAGE.—Gurley electric printing water-stage recorder on left bank (Pl. VI, *B*), put in operation January 2, 1913. Previously station was maintained in the pool above

Digitized by Google

by the Yosemite Power Co. Gage consisted of a vertical staff on left bank at site of United States Geological Survey's present cable. November 17, 1912, the Survey began collecting records, and developed a relation between the two gages.

DISCHARGE MEASUREMENTS.—Made from cable, one-third mile above gage.

CHANNEL AND CONTROL.—Boulders and solid rock; probably permanent. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year occurred either June 1 or 8, gage height not known; minimum stage occurred the last part of September, gage height not known.

1907–1915: Maximum stage recorded, 14.00 feet January 14, 1909 (discharge, 27,200 second-feet); minimum stage recorded, 0.70 foot October 5, 1912 (discharge, 32 second-feet). Record incomplete.

DIVERSIONS.—At Harden ranch, 7 miles above the mouth of South Fork of Tuolumne River, a small amount of water is diverted for irrigation.

REGULATION.—None.

ACCURACY.—Much trouble experienced with the gage this year. Monthly mean discharge for the months for which gage-height record is incomplete have been estimated by comparison with the summation of the records of flow for Tuolumne River at Hetch Hetchy dam site, Cherry Creek, Eleanor Creek, and South Fork of Tuolume River. Results excellent for periods when recorder was operating.

The following discharge measurement was made by Charles Leidl: April 22, 1915: Gage height, 7.51 feet; discharge, 5,260 second-feet.

Daily discharge, in second-feet, of Tuolumne River near Groveland, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	June.	July.	Aug.	Sept.
1	110	522	114	213	.....	994	2,330	.....	6,320	648	171
2	108	724	98	.....	.....	974	2,880	.....	6,750	574	179
3	102	550	110	.....	.....	980	3,430	.....	6,530	540	183
4	95	470	175	.....	.....	1,010	3,290	.....	6,110	512	172
5	90	410	211	.....	.....	980	2,740	.....	5,520	473	141
6	84	360	207	.....	.....	950	2,330	.....	3,880	401	126
7	79	325	222	.....	.....	896	2,170	.....	3,430	355	118
8	78	295	222	.....	.....	872	2,070	.....	3,580	335	111
9	78	265	199	.....	.....	878	2,170	.....	4,110	327	99
10	82	240	224	.....	.....	850	2,810	.....	4,110	319	90
11	84	217	242	.....	.....	884	3,650	.....	4,440	311	79
12	78	201	233	.....	.....	908	4,440	.....	4,270	303	66
13	72	187	217	.....	.....	932	4,960	.....	3,720	296	61
14	67	177	211	.....	.....	1,350	3,720	.....	3,290	289	58
15	63	163	203	.....	.....	1,970	3,500	.....	2,680	282	56
16	59	159	224	.....	.....	2,170	4,030	.....	2,170	275	54
17	58	146	250	.....	.....	2,330	5,140	.....	2,120	268	53
18	58	143	248	.....	.....	2,330	6,110	.....	1,870	255	53
19	83	132	238	.....	.....	2,500	6,750	.....	1,670	235	53
20	179	128	248	.....	.....	2,680	6,750	.....	1,620	215	53
21	452	118	233	.....	1,060	2,940	5,520	.....	1,620	203	52
22	358	114	226	.....	994	3,220	5,330	7,190	1,870	193	52
23	310	110	224	.....	1,020	3,290	4,780	7,650	2,440	179	52
24	300	100	224	.....	968	3,220	4,110	7,420	2,500	163	52
25	292	99	235	.....	950	2,810	4,030	6,970	1,920	150	52
26	275	96	235	.....	944	2,220	3,500	5,710	1,480	150	52
27	275	94	231	.....	1,190	3,430	.....	5,910	1,240	149	52
28	275	94	219	.....	1,110	3,500	.....	6,530	1,080	148	52
29	272	111	209	.....	.....	2,740	.....	6,530	926	147	51
30	571	129	205	.....	.....	2,220	.....	6,750	830	155	51
31	593	.....	217	.....	.....	2,170	.....	.....	742	163	.....

NOTE.—Discharge, except as noted below, determined from a well-defined rating curve. Discharge Aug. 9–16, 27–31, Sept. 1, 18–24 and 26–30, estimated by interpolation and comparison with the summation of daily discharge of Tuolumne River at Hetch Hetchy dam site, Cherry Creek, Eleanor Creek, and South Fork of Tuolumne River.

Digitized by Google

A. CABLE SUPPORT ON STANISLAUS RIVER AT KNIGHTS FERRY, CAL.

B. TIMBER WELL AND GAGE HOUSE ON TUOLUMNE RIVER AT GROVELAND, CAL.

Digitized by Google

Digitized by Google

Monthly discharge of Tuolumne River near Groveland, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	593	58	183	11,300	A.
November	724	94	229	13,600	A.
December	250	98	211	13,000	A.
January	.....	.....	[a]402	24,700	
February	.....	.....	[a]1,140	63,300	
March	3,500	850	1,910	117,000	A.
April	6,750	2,070	[a]3,940	234,000	B.
May	.....	.....	[a]5,830	358,000	
June	.....	5,710	[a]8,380	499,000	
July	6,750	743	3,060	188,000	A.
August	648	147	291	17,900	B.
September	183	51	83.1	4,940	B.
The year	.....	51	2,130	1,540,000	

[a] Estimated by comparison with a summation of the discharges of Tuolumne River at Hetch Hetchy dam site, Cherry Creek, Eleanor Creek, and South Fork of Tuolumne River.

TUOLUMNE RIVER ABOVE LA GRANGE DAM, NEAR LA GRANGE, CAL.

LOCATION.—In the NE. ¼ sec. 3, T. 3 S., R. 14 E., 3½ miles above La Grange dam and 5 miles above La Grange, Stanislaus County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 19 to September 30, 1915.

GAGE.—Gurley weight-driven printing water-stage recorder in reinforced concrete gage house and well on left bank.

DISCHARGE MEASUREMENTS.—Made from car and cable 80 feet below the gage or by wading.

CHANNEL AND CONTROL.—Bed of channel is solid rock and boulders. Both banks high but right bank is subject to overflow at extremely high water. Control is solid rock dyke extending entirely across the stream and at low water the fall in water surface at control is about 5 feet.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 20.5 feet at 7.15 a. m. May 13 (discharge, 19,500 second-feet); minimum stage recorded, 2.06 feet September 30 (discharge, 54 second-feet).

DIVERSIONS.—Yosemite Power Co.'s canal heads 9½ miles above gage and returns its water at about half a mile above the bridge at La Grange. There is also a diversion from South Fork of Tuolumne River at Harden ranch for irrigation.

REGULATION.—None.

ACCURACY.—Rating curve well defined; stage-discharge relation not likely to change. Results excellent for periods for which gage-height record is obtained.

This station will take the place of the one at the dam because the low-water estimates of the latter are unreliable. The one at the dam is being continued to obtain a comparison.

Digitized by Google

Discharge measurements of Tuolumne River above La Grange dam, near La Grange, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 22	Charles Leidl	10.10	4,030	June 8	Charles Leidl	18.07	15,500
May 3	do	9.56	3,360	17	do	14.38	9,770
June 3	do	15.93	11,700	18	do	14.13	9,400
4	do	14.19	9,560	19	do	13.70	8,870
5	do	14.78	10,500	20	do	13.53	8,510
6	do	16.11	12,400	30	H. J. Tompkins	13.17	8,090
6	do	15.70	12,200	July 1	do	12.61	6,930
7	do	17.45	15,000	Aug. 26	Charles Leidl	3.12	205
7	do	16.92	13,500	Sept. 30	do	2.06	52

Daily discharge, in second-feet, of Tuolumne River above La Grange dam, near La Grange, Cal., for the year ending Sept. 30, 1915.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	3,060	4,330	14,600	6,820	.....	159
2	.....	3,330	3,600	13,800	6,820	.....	159
3	.....	4,110	3,240	11,500	6,820	.....	172
4	.....	4,670	3,240	9,360	6,400	.....	175
5	.....	4,110	3,700	9,510	5,700	.....	170
6	.....	3,420	3,600	11,000	3,800	.....	170
7	.....	3,060	3,900	12,700	3,420	.....	150
8	.....	3,060	4,440	13,800	3,510	.....	145
9	.....	3,060	4,440	14,300	4,000	.....	.....
10	.....	3,700	5,040	12,900	4,110	.....	.....
11	.....	4,670	7,260	12,100	4,440	.....	.....
12	.....	5,700	10,400	9,360	4,220	.....	.....
13	.....	6,260	14,900	7,710	3,700	.....	.....
14	.....	5,170	8,910	7,710	3,240	.....	.....
15	.....	4,670	7,110	8,910	2,610	.....	.....
16	.....	5,040	8,010	9,360	2,280	.....	.....
17	.....	6,260	12,100	9,210	2,060	.....	.....
18	.....	7,560	11,600	8,910	1,780	.....	.....
19	3,150	8,310	8,460	8,310	1,630	.....	.....
20	3,240	8,760	6,820	7,560	1,570	.....	.....
21	3,420	8,010	5,700	7,710	1,540	.....	.....
22	3,700	7,260	5,700	8,160	1,920	.....	.....
23	4,000	6,400	6,540	8,010	2,360	.....	.....
24	4,440	5,430	8,010	7,710	2,360	.....	.....
25	4,330	5,040	7,560	6,960	1,780	193	.....
26	4,000	4,550	6,820	5,980	1,430	203	.....
27	3,240	4,330	9,360	6,400	1,360	194	.....
28	4,550	5,040	12,300	6,960	1,330	178	.....
29	5,840	5,300	12,000	7,260	.....	165	.....
30	4,220	5,300	11,800	6,820	.....	150	54
31	3,330	.....	12,600	.....	.....	146	.....

NOTE.—Discharge determined from a well-defined rating curve. July 29 to Aug. 24 well was silted up; Sept. 9–30 stage was below bottom of well.

Monthly discharge of Tuolumne River above La Grange dam, near La Grange, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
Mar. 19–31	5,840	3,150	3,960	102,000	A.
April	8,760	3,060	5,150	306,000	A.
May	14,900	3,240	7,530	463,000	A.
June	14,600	5,980	9,490	565,000	A.
July 1–28	6,820	1,330	3,320	184,000	A.
The period	.....	.....	.....	1,620,000	

Digitized by Google

Combined daily discharge, in second-feet, of Tuolumne River above La Grange dam and Yosemite Power Co.'s canal, near La Grange, Cal., for the year ending Sept. 30, 1915.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	3,120	4,390	14,700	6,880	.....	221
2	.....	3,390	3,660	13,900	6,880	.....	221
3	.....	4,170	3,300	11,600	6,880	.....	234
4	.....	4,730	3,300	9,430	6,460	.....	237
5	.....	4,170	3,760	9,580	5,760	.....	232
6	.....	3,470	3,660	11,100	3,860	.....	232
7	.....	3,120	3,960	12,800	3,480	.....	212
8	.....	3,120	4,500	13,900	3,570	.....	207
9	.....	3,120	4,500	14,300	4,060	.....	.....
10	.....	3,710	5,100	13,000	4,170	.....	.....
11	.....	4,730	7,320	12,200	4,500	.....	.....
12	.....	5,760	10,500	9,420	4,280	.....	.....
13	.....	6,320	15,000	7,770	3,760	.....	.....
14	.....	5,230	8,970	7,770	3,300	.....	.....
15	.....	4,730	7,170	8,970	2,670	.....	.....
16	.....	5,100	8,070	9,420	2,340	.....	.....
17	.....	6,320	12,200	9,270	2,120	.....	.....
18	.....	7,560	11,700	8,970	1,840	.....	.....
19	3,210	8,310	8,520	8,370	1,690	.....	.....
20	3,300	8,820	6,880	7,620	1,630	.....	.....
21	3,480	8,070	5,760	7,770	1,600	.....	.....
22	3,760	7,320	5,760	8,220	1,980	.....	.....
23	4,060	6,460	6,600	8,070	2,390	.....	.....
24	4,500	5,490	8,070	7,770	2,420	.....	.....
25	4,390	5,100	7,620	7,020	1,840	255	.....
26	4,060	4,550	6,880	6,040	1,490	265	.....
27	3,300	4,390	9,420	6,460	1,420	256	.....
28	4,610	5,100	12,400	7,020	1,390	240	.....
29	5,880	5,360	12,100	7,320	.....	227	.....
30	4,280	5,360	11,900	6,880	.....	212	113
31	3,390	.....	12,700	.....	.....	208	.....

NOTE.—See page 182 for daily-discharge table for Yosemite Power Co.'s canal.

Combined monthly discharge of Tuolumne River above La Grange dam and Yosemite Power Co.'s canal, near La Grange, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
March 19-31	5,880	3,210	4,020	104,000
April	8,820	3,120	5,210	310,000
May	15,000	3,300	7,600	467,000
June	14,700	6,040	9,560	569,000
July 1-28	6,880	1,390	3,380	188,000
The period	.....	.....	.....	1,640,000

NOTE.—See page 182 for monthly discharge table for Yosemite Power Co.'s canal.

TUOLUMNE RIVER AT LA GRANGE DAM, NEAR LA GRANGE, CAL.

LOCATION.—In the NE. ¼ SE. ¼ sec. 17, T. 3 S., R. 14 E., at La Grange dam, about 1½ miles northeast of La Grange, Stanislaus County.

DRAINAGE AREA.—1,500 square miles.

RECORDS AVAILABLE.—August 30, 1895 to September 30, 1915.

GAGE.—Painted on rock ledge on right bank 80 feet above dam; read twice a day by F. A. Townsend. Zero of gage is at average elevation of crest of dam. Until March 31, 1908, the station was located at the wagon bridge at La Grange.

DISCHARGE.—Computed by use of weir formula from gage heights showing depth of water on creast of curved masonry diversion dam. Coefficient was determined from current meter measurements made at highway bridge at La Grange, cor-

Digitized by Google

rected to give discharge at dam. To obtain the total flow of Tuolumne River above La Grange dam it is necessary to combine the flow over the dam with the discharge of Modesto, Turlock, and Yosemite Power Co.'s canals.

CHANNELS AND CONTROL.—River bed composed of gravel and boulders. Dam is a permanent control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.1 feet, May 13 (discharge, 17,200 second-feet); there was no flow over dam during most of October, November, December, August and September.

1907–1915: Maximum stage recorded, 16.45 feet, on the morning of January 31, 1911; crest of flood from high-water mark on gage (discharge, 60,300 second-feet); there was no flow over dam for long periods each year.

DIVERSIONS.—Modesto and Turlock canals divert at dam. Yosemite Power Co.'s canal heads 13 miles above the dam and returns its water below the dam, about half a mile above the bridge at La Grange. There is also a diversion from South Fork of Tuolumne River at Harden ranch, for irrigation.

REGULATION.—At low water, the small amount of storage behind La Grange dam affects the flow.

ACCURACY.—Results good except at extremely low water. The combined flow of river and canals is affected by seepage through dam and from canals, by the use of flashboards on the dam for a short period during the low-water flow, by the small amount of water that is occasionally spilled from canals at the waste gates above the gaging stations, and by the water discharged through the ports and sand gates in the dam during certain periods of the year.

The following discharge measurement was made by Charles Leidl: March 21, 1915, gage height, 2.20 feet; discharge, 3,050 second-feet.

Daily discharge, in second-feet, of Tuolumne River over dam near La Grange, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	.....	274	.....	229	5,180	2,560	1,500	2,370	13,300	4,470
2	.....	229	.....	229	6,180	2,090	1,660	1,830	12,300	4,940
3	.....	320	.....	213	4,700	1,740	2,370	1,420	10,100	4,700
4	.....	115	.....	421	2,460	1,500	2,950	1,580	7,800	4,470
5	.....	29	.....	421	2,000	1,340	2,460	1,830	8,360	3,580
6	.....	.....	.....	530	1,740	1,180	1,830	1,660	9,810	2,370
7	.....	.....	.....	421	1,500	1,040	1,580	2,000	11,700	1,420
8	.....	.....	.....	476	2,180	905	1,740	2,460	12,300	1,420
9	.....	.....	.....	747	9,810	710	1,660	2,280	12,700	1,500
10	.....	.....	.....	589	5,670	589	2,180	2,950	11,700	1,740
11	.....	.....	.....	530	5,180	370	3,370	4,700	10,400	2,000
12	.....	.....	.....	589	3,370	149	4,470	7,800	7,240	2,280
13	.....	.....	.....	530	2,090	81	4,700	13,300	5,670	1,660
14	.....	.....	.....	2,460	1,580	240	4,020	7,240	5,670	1,260
15	.....	.....	.....	1,110	1,500	476	3,370	5,180	6,970	772
16	.....	.....	.....	648	1,500	905	3,800	6,180	7,520	1,660
17	.....	.....	.....	530	3,800	1,260	4,940	9,510	6,970	910
18	.....	.....	.....	530	3,370	1,580	6,180	10,100	6,440	750
19	.....	.....	.....	530	2,950	1,580	7,240	6,970	6,440	0
20	.....	.....	.....	421	4,940	1,660	7,520	5,180	5,920	0
21	.....	.....	.....	421	3,580	2,750	6,180	4,240	5,420	0
22	.....	.....	213	421	2,950	2,950	5,670	4,240	5,920	0
23	.....	.....	229	443	2,560	2,560	5,180	4,940	6,180	30
24	.....	.....	213	421	2,280	2,560	4,020	6,180	5,920	70
25	.....	.....	229	530	2,280	2,460	3,580	5,670	5,420	60
26	.....	.....	213	530	2,000	2,090	2,950	5,180	4,240	0
27	.....	.....	165	589	1,830	1,740	2,560	8,080	3,800	0
28	.....	.....	165	2,950	3,800	2,750	3,160	11,400	4,470	0
29	.....	.....	149	2,950	.....	4,240	3,370	10,700	5,180	0
30	.....	.....	189	2,560	.....	2,460	3,800	10,700	5,180	0
31	229	.....	229	1,920	.....	1,660	.....	11,400	.....	0

NOTE.—Discharge determined from a rating curve developed from current meter discharge measurements and from the weir formula $Q=905h^{\frac{3}{2}}$. Flashboards on dam July 17, 18, and 23–25; discharge estimated. No flow over dam, Oct. 1–30, Nov. 6 to Dec. 21; July 19–22, and July 26 to Sept. 30.

Monthly discharge of Tuolumne River over dam near La Grange, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	229	0	7.4	455	
November	320	0	32.2	1,920	D.
December	229	0	64.3	3,950	C.
January	2,950	213	835	51,300	B.
February	9,810	1,500	3,320	184,000	A.
March	4,240	81	1,620	99,600	A.
April	7,520	1,500	3,670	218,000	A.
May	13,300	1,420	5,780	355,000	A.
June	13,300	3,800	7,700	458,000	A.
July	4,940	0	1,360	83,600	B.
August	0	0	0	0	
September	0	0	0	0	
The year	13,300	0	2,010	1,460,000	

Combined daily discharge, in second-feet, of Tuolumne River and three canals near La Grange, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	176	336	62	291	5,270	2,980	3,160	4,400	14,800	6,790	635	192
2	170	291	62	295	6,260	2,530	3,320	3,930	13,900	7,300	689	194
3	164	382	62	311	4,770	2,320	4,020	3,670	11,700	7,040	644	197
4	158	177	62	484	2,550	2,260	4,470	3,830	9,430	6,850	625	197
5	132	91	53	480	2,100	2,160	3,980	4,080	9,150	5,920	595	104
6	136	62	56	589	1,840	2,060	3,460	3,910	11,400	4,730	571	104
7	123	62	5	480	1,670	2,000	3,130	4,230	13,100	3,810	537	104
8	115	62	59	538	2,350	1,860	3,180	4,690	14,200	3,810	517	104
9	115	0	62	791	9,860	1,800	3,060	4,490	14,700	3,880	495	95
10	119	18	56	603	5,720	1,720	3,500	5,160	12,800	4,150	449	98
11	62	62	62	592	5,210	1,600	4,500	6,890	12,100	4,410	391	88
12	62	62	59	667	3,420	1,560	5,600	9,850	9,420	4,680	415	92
13	0	62	62	634	2,250	1,620	5,810	15,300	7,940	4,070	393	92
14	47	62	62	2,560	2,080	1,780	5,050	9,250	7,980	3,680	388	92
15	62	62	2	1,210	1,900	2,010	4,500	7,210	9,260	3,190	354	62
16	0	62	62	688	2,260	2,370	4,930	8,190	9,790	2,740	342	0
17	62	62	62	592	4,620	2,730	6,150	11,400	9,220	2,540	345	59
18	62	62	62	634	4,220	3,050	7,350	11,600	8,650	2,340	330	59
19	62	62	62	634	3,400	3,110	8,450	8,450	8,760	2,140	306	64
20	62	62	62	525	5,220	3,260	8,860	6,840	8,240	2,050	287	33
21	62	62	62	525	3,870	4,060	7,460	6,040	7,750	1,940	269	48
22	62	62	275	518	3,250	4,260	7,020	6,040	8,240	2,230	255	92
23	62	62	291	505	2,860	3,800	6,580	6,740	8,450	2,270	245	92
24	62	62	275	483	2,580	4,370	5,430	7,840	8,190	2,410	244	88
25	62	62	293	605	2,580	4,420	5,040	7,180	7,730	2,410	237	88
26	62	63	279	631	2,400	3,770	4,450	6,680	6,540	2,000	245	88
27	62	64	227	693	2,230	3,390	4,150	9,560	6,110	1,790	245	92
28	62	62	227	3,040	4,230	4,380	5,110	12,900	6,780	1,270	223	92
29	62	62	211	3,030	.....	5,700	5,320	12,200	7,490	1,020	212	91
30	62	62	251	2,640	.....	4,070	5,810	12,200	7,490	933	192	87
31	291	.....	291	2,000	.....	3,390	.....	12,900	.....	837	191	.....

NOTE.—Amount of water discharged through ports in dam and spillways of canals unknown and not included in record. Turlock canal spilled water Oct. 10, 11, 22, and 23, and Dec. 5–22. Both ports open Oct. 12, 13, 15–31, Nov. 1–25, 28–30, Dec. 1–22. One port open Sept. 4–15. Both ports open Sept. 16–18 and 30. See p. 184 for daily discharge table of Modesto canal, p. 185 for that of Turlock canal, and p. 182 for that of Yosemite Power Co.'s canal.

Digitized by Google

Combined monthly discharge of Tuolumne River and three canals near La Grange, Cal., for the year ending Sept. 30, 1915.

[Drainage area, 1,500 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	291	0	90.3	0.060	0.07	5,550
November	382	0	90.8	.061	.07	5,400
December	293	2	122	.081	.09	7,500
January	3,040	291	912	.608	.70	56,100
February	9,860	1,670	3,610	2.41	2.51	200,000
March	5,700	1,560	2,920	1.95	2.25	180,000
April	8,860	3,060	5,100	3.40	3.79	303,000
May	15,300	3,670	7,670	5.11	5.89	472,000
June	14,800	6,110	9,710	6.47	7.22	578,000
July	7,300	837	3,390	2.26	2.61	208,000
August	689	191	383	.255	.29	23,600
September	197	0	96.3	.064	.07	5,730
The year	15,300	0	2,820	1.88	25.56	2,040,000

NOTE.—See p. 184 for monthly discharge table of Modesto canal, p. 186 for that of Turlock canal, and p. 183 for that of Yosemite Power Co.'s canal.

CHERRY CREEK NEAR SEQUOIA, CAL.

LOCATION.—In the SW. ¼ sec. 28, T. 2 N., R. 19 E., in Stanislaus National Forest, at abandoned sawmill camp, 3 miles by trail from Lake Eleanor, and about 13 miles north of Sequoia, Tuolumne County.

DRAINAGE AREA.—114 square miles [1] (above dam site in sec. 5, T. 1 N., R. 19 E.).

RECORDS AVAILABLE.—April 1, 1910, to September 30, 1915.

GAGE.—Gurley printing water-stage recorder on right bank 800 feet above site of old suspension bridge. Original gage was a Lietz graph water-stage recorder at the bridge. It was moved upstream to present site (new datum) October 22, 1913, and replaced by the present gage (same datum) November, 30, 1914.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading. Bridge collapsed shortly before March 24, 1915. On this date a cable and car was installed 10 feet upstream from bridge site.

CHANNEL AND CONTROL.—Channel is fine gravel and sand which shifts slightly, but control is a solid rock dike except at right bank, where it is gravel and small boulders. Point of zero flow is at gage height 0.4 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 8.55 feet at 9.30 p. m. June 8 (discharge, determined from extension of rating curve, 3,990 second-feet); minimum stage from water-stage recorder, 0.86 foot, September 26 to 30 (discharge, 1.5 second-feet).

1910–1915: Maximum mean daily discharge, 7,000 second-feet January 30, 1911 (maximum stage unknown); no flow September 6 to 12, 1910.

WINTER FLOW.—Stream freezes over at gage but not at control. No effect of ice upon the stage-discharge relation has been detected.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Results excellent.

[1] Freeman, J. R., The Hetch Hetchy water supply for San Francisco, p. 24, 1912.

Digitized by Google

Discharge measurements of Cherry Creek near Sequoia, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 30	Lasley Lee	1.49	24	May 24	C. P. Firestone	5.06	1,280
Dec. 13	do	2.08	83	27	do	5.65	1,590
15	do	2.02	75	29	do	5.91	1,710
Jan. 15	do	2.14	99	June 25	Lasley Lee	4.79	1,170
24	do	1.94	66	25	do	4.72	1,110
Mar. 27	do	3.07	387	Aug. 13	do	1.49	25
Apr. 18	do	4.97	1,190	Sept. 12	do	.91	2.6
May 16	C. P. Firestone	4.36	884	28	C. J. Emerson	.86	1.1
21	do	3.43	503				

Daily discharge, in second-feet, of Cherry Creek near Sequoia, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6.7	191	20	54	258	123	406	501	2,660	1,360	64	4.3
2	6.4	252	20	67	197	115	528	394	2,250	1,380	56	4.3
3	6.1	164	30	81	110	120	716	340	1,750	1,300	51	4.0
4	5.5	126	44	81	115	136	695	406	1,620	1,200	48	3.6
5	5.2	99	59	72	128	147	512	413	1,960	1,000	44	3.4
6	4.6	81	69	66	139	142	402	512	2,410	758	41	3.2
7	4.0	69	75	63	131	128	406	612	2,660	653	39	3.0
8	5.5	59	66	67	139	126	376	695	2,840	695	37	2.8
9	17	50	67	63	133	131	512	780	2,660	780	34	2.6
10	11	44	69	69	123	123	695	982	2,410	802	32	2.4
11	7.0	40	69	70	123	147	868	1,560	2,020	846	29	2.2
12	5.8	36	75	60	120	153	982	1,360	1,470	802	27	2.2
13	4.6	34	83	77	126	173	982	1,200	1,250	716	25	2.0
14	4.0	31	72	123	139	236	737	716	1,620	632	23	2.8
15	3.8	29	67	77	136	306	824	846	1,880	497	22	2.4
16	3.4	26	60	77	216	369	1,050	1,280	1,880	425	20	2.2
17	3.4	24	62	77	268	428	1,300	1,880	1,680	376	18	2.0
18	37	22	67	79	188	455	1,560	1,030	1,680	319	18	2.0
19	22	20	69	84	161	489	1,620	780	1,620	278	16	1.9
20	191	18	64	86	139	512	1,500	632	1,410	261	15	1.8
21	110	17	62	81	144	572	1,300	612	1,470	255	13	1.8
22	103	16	56	70	118	632	1,080	824	1,620	258	12	1.8
23	103	15	64	64	115	695	890	1,030	1,620	278	11	1.8
24	101	15	69	64	113	716	758	1,330	1,470	362	9.8	1.6
25	79	14	66	69	118	674	737	890	1,300	302	9.0	1.6
26	69	13	63	64	131	552	653	1,200	1,120	223	7.8	1.5
27	66	13	56	120	142	440	824	1,880	1,220	167	7.4	1.5
28	63	24	52	176	153	824	1,030	2,410	1,380	131	6.4	1.5
29	139	33	52	239	.....	504	868	2,180	1,470	106	6.1	1.5
30	421	24	59	142	.....	366	674	2,180	1,360	88	5.5	1.5
31	204	.....	60	144	.....	333	.....	2,490	.....	75	5.2	.....

NOTE.—Discharge determined from a well-defined rating curve.

Digitized by Google

Monthly discharge of Cherry Creek near Sequoia, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	421	3.4	58.5	3,600	A.
November	252	13	53.3	3,170	A.
December	83	20	60.2	3,700	A.
January	239	54	87.9	5,400	A.
February	268	110	147	8,160	A.
March	824	115	351	21,660	A.
April	1,620	376	850	50,600	A.
May	2,490	340	1,100	67,600	A.
June	2,840	1,120	1,790	107,000	A.
July	1,380	75	559	34,400	A.
August	6.4	5.2	24.3	1,490	A.
September	4.3	1.5	2.37	141	C.
The year	2,840	1.5	423	307,000	

ELEANOR CREEK NEAR SEQUOIA, CAL.

LOCATION.—In the SW. ¼ SE. ¼ sec. 34, T. 2 N., R. 19 E., in Yosemite National Park, 500 feet above trail bridge, half a mile below Lake Eleanor, about 12 miles north of Sequoia, Tuolumne County, and 26 miles by trail from Hamiltons Station.

DRAINAGE AREA.—79 square miles [1] (above dam site in sec. 3, T. 1 N., R. 19 E.).

RECORDS AVAILABLE.—November 20, 1909, to September 30, 1915.

GAGE.—Lietz water-stage recorder on right bank with a vertical staff in two sections a short distance upstream. Original gage was probably the staff gage.

DISCHARGE MEASUREMENTS.—Made from car and cable 90 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed of channel composed of small boulders. Control is fairly permanent. Point of zero flow is at gage height 0.8 foot. Banks fairly high and probably not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 7.85 feet at 3.30 a. m. May 13 (discharge, 1,540 second-feet); minimum stage, 0.94 foot from 4 to 6 p. m. September 30 (discharge, 0.7 second-foot).

1910–1915: Maximum stage recorded, 13.1 feet January 30, 1911 (discharge, 5,000 second-feet); no flow September 8 to 14, 1910.

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.— Natural regulation by Lake Eleanor reduces the fluctuations in stage.

ACCURACY.—Results excellent.

Discharge measurements of Eleanor Creek near Sequoia, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 2	Lasley Lee	1.14	2.1	May 13	Lasley Lee	7.49	1,380
Nov. 30	....do	1.43	12	13	....do	7.40	1,330
Dec. 16	....do	1.88	41	14	....do	6.23	934
Jan. 1	....do	1.93	41	14	....do	6.04	891
12	....do	2.10	55	15	....do	5.50	736
15	....do	2.32	74	17	....do	7.66	1,460
25	....do	2.22	64	25	C. P. Firestone	6.52	1,090
Feb. 5	....do	2.99	153	25	Lasley Lee	6.45	1,020
Mar. 24	....do	4.98	578	July 8	....do	3.43	227
Apr. 17	....do	5.89	860	Aug. 14	....do	1.55	17
May 12	....do	7.01	1,220	Sept. 13	....do	1.11	1.1
13	....do	7.66	1,480	29	C. P. Firestone	.99	.4

[1] Freeman, J. R., The Hetch Hetchy water supply for San Francisco, p. 24, 1912.

Digitized by Google

Daily discharge, in second-feet, of Eleanor Creek near Sequoia, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.5	49	12	40	168	134	313	464	1,300	392	47	4.5
2	2.5	59	13	40	202	130	346	380	1,220	404	43	4
3	2.5	76	14	42	198	123	464	313	1,050	404	38	4
4	2.5	80	16	44	173	120	568	302	890	392	35	3.5
5	2	77	17	47	154	120	516	313	860	357	33	3.5
6	2	68	18	49	141	119	471	324	954	302	30	3
7	2	59	20	50	130	119	426	380	1,020	260	27	3
8	2	51	21	50	132	119	380	440	1,080	226	25	3
9	2	45	23	51	151	118	335	477	1,120	215	24	2.5
10	2	40	27	51	152	117	428	582	1,020	213	22	2.5
11	2	37	30	51	145	117	568	922	922	215	21	2.5
12	2	33	32	53	138	117	725	1,260	770	222	20	2.5
13	2	29	34	56	128	124	830	1,400	624	220	18	2
14	2	27	36	67	122	145	680	954	582	206	18	2
15	1.5	25	37	72	119	178	596	725	624	186	16	2
16	1.5	22	38	72	127	224	666	830	652	166	15	1.5
17	1.5	21	40	71	168	280	860	1,330	624	146	14	1.5
18	1.5	19	42	70	179	346	986	1,160	596	132	12	1.5
19	1.5	18	42	69	171	404	1,080	800	568	116	12	1.5
20	3	18	42	68	163	428	1,050	624	516	102	11	1.5
21	7	17	42	66	152	452	954	529	477	96	10	1.5
22	10	16	42	64	142	503	890	529	477	90	10	1.5
23	14	16	42	63	133	555	740	638	477	88	9	1
24	18	15	42	61	124	596	610	1,120	464	87	8.5	1
25	20	14	42	62	118	596	529	1,050	440	87	7.5	1
26	22	14	42	63	117	542	464	890	404	86	7	1
27	24	14	42	67	117	440	440	1,080	380	80	7	1
28	24	13	42	89	127	503	529	1,360	380	72	7	1
29	25	12	42	110	.....	568	596	1,330	404	65	5.5	1
30	33	12	42	132	.....	452	582	1,220	416	59	5.5	1
31	49	.....	41	134	.....	346	.....	1,220	.....	53	5	.....

NOTE.—Discharge determined from a well-defined rating curve. Discharge interpolated Jan. 20–22, 28, and 29; Feb. 11 and 23; Apr. 6–8 and Aug. 4 and 5.

Monthly discharge of Eleanor Creek near Sequoia, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	49	1.5	9.24	568	A.
November	80	12	33.2	1,980	A.
December	42	12	32.7	2,010	A.
January	134	40	65.3	4,020	A.
February	202	117	146	8,110	A.
March	596	117	295	18,100	A.
April	1,080	313	621	37,000	A.
May	1,400	302	805	49,500	A.
June	1,300	380	710	42,200	A.
July	404	53	185	11,400	A.
August	47	5.0	18.2	1,120	A.
September	4.5	1.0	2.10	125	B.
The year	1,400	1.0	243	176,000	

EVAPORATION FROM LAKE ELEANOR NEAR SEQUOIA, CAL.

LOCATION.—In sec. 35, T. 2 N., R. 19 E., in Yosemite National Park, about 12 miles north of Sequoia, Tuolumne County.

RECORDS AVAILABLE.—February 27 to September 30, 1915.

EQUIPMENT.—Evaporation pan is 48 inches in diameter, 10 inches deep, hung by four turnbuckles in a raft of cedar logs. Raft is anchored about 1,000 feet from the nearest shore.

Digitized by Google

METHOD.—A field engineer makes observations several times a week by measuring the amount of water he adds to or takes out of the volume in the pan in order to bring the water surface in the pan to the point of a metal cone set at its center. The water added or taken out is measured in a small can, the cubical content of which is known. Number of cans is reduced to depth in inches and that, corrected by the amount of precipitation, gives amount of evaporation.

ELEVATION.—About 4,700 feet above sea level.

Total evaporation in inches, since last day recorded, of Lake Eleanor near Sequoia, Cal., for the year ending Sept. 30, 1915.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1			0.09		0.07		0.25	
2				0.11				
3							.56	0.71
4		0.52				0.64		
5			.31	.18	1.77		.59	
6								
7		a.27				.46		
8				.18	.30			1.49
9			.36				.80	
10		.21		.12	.38	.46		.39
11							.51	
12		.10	.23			.31		
13				a.19	.33		.71	.82
14		.25				.36		
15			.25				.34	
16				.16	.36	.38		
17								.89
18		.21			.49			
19			.36			.74	1.10	.38
20				.27	.25			
21		.23				.54		.41
22							.89	
23						.43		
24		.25			.79			.93
25							.51	
26	0.00					.92		
27					.33		.54	
28	.26		a.72					.69
29		.51				.98		
30		.11		.48				.41
31		.18		.75		.50	1.03	
Total for month		2.73	2.43	1.96	5.55	6.72	7.83	7.12

a Estimated.

JAWBONE CREEK NEAR TUOLUMNE, CAL.

LOCATION.—In the NE. ¼ sec. 33, T. 1 N., R. 18 E., at Jawbone ranger station, in Stanislaus National Forest, 1 mile above junction with Tuolumne River, 14 miles southeast of Tuolumne, Tuolumne County, and 12 miles northeast of Groveland.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 13, 1910, to September 29, 1915 (fragmentary), when the station was discontinued.

GAGE.—Vertical staff in two sections fastened to an alder tree on right bank 100 feet below trail crossing; read once a day occasionally, by G. L. Adams.

DISCHARGE MEASUREMENTS.—Made from footbridge about 1,000 feet below gage or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; shift during high water.

EXTREMES OF STAGE.—Maximum stage recorded during year, 0.71 foot April 16; minimum stage recorded, −1.40 feet September 21.

1910–1915: Maximum stage recorded, 3.72 feet January 30, 1911; minimum stage recorded, −1.40 feet September 21, 1915 (record incomplete).

Digitized by Google

WINTER FLOW.—Stage-discharge relation possibly affected by ice.
DIVERSIONS.—Small irrigation ditch at ranger's station above the gage.
REGULATION.—None.
COOPERATION.—Gage-height record furnished by United States Forest Service.

Data inadequate for determination of discharge.

Discharge measurements of Jawbone Creek near Tuolumne, Cal., during the year ending Sept. 30, 1915.

[Made by Lasley Lee.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Apr. 5	0.58	54
16	.71	66

Daily gage height, in feet, of Jawbone Creek near Tuolumne, Cal., for the year ending Sept. 30, 1915.

Day.	Apr.	July.	Aug.	Sept.	Day.	Apr.	July.	Aug.	Sept.
1					16	0.71			
2					17		−1.15		
3					18			−1.33	
4			−1.26	−1.37	19		−1.20		
5	0.58				20				
6					21				−1.40
7			−1.30	−1.38	22		−1.22		
8					23				
9		−1.08			24			−1.33	
10			−1.30	−1.38	25				
11					26		−1.25	−1.35	−1.38
12		−1.12		−1.38	27				
13		−1.12			28				
14			−1.30		29				−1.38
15		−1.15		−1.38	30			−1.36	
					31		−1.25		

SOUTH FORK OF TUOLUMNE RIVER NEAR SEQUOIA, CAL.

LOCATION.—In the NW. ¼ sec. 31, T. 1 S., R. 19 E., at highway bridge at sawmill 600 feet above Hazel Green Creek, 1 mile above intake of Golden Rock ditch, and 3 miles west of Sequoia, Tuolumne County.
DRAINAGE AREA.—Not measured.
RECORDS AVAILABLE.—January 11, 1914, to September 30, 1915.
GAGE.—Vertical staff fastened to downstream end of right abutment of bridge; read twice a day by J. J. Scofield.
DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.
CHANNEL AND CONTROL.—Gravel and boulders; apt to shift during high water Both banks are high, but right bank may be overflowed at extremely high water.
EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.5 feet at 7 a. m. May 13 (discharge, 980 second-feet); minimum stage recorded, 1.20 feet October 1 to 19 (discharge, 8.7 second-feet).

1914–15: Maximum stage recorded, 8.0 feet at 7 a. m. and 5 p. m. January 25, 1914 (discharge, 3,510 second-feet, determined from extension of rating curve and may be subject to error); minimum state recorded, 1.20 feet August 17 to September 18 and September 20 to October 19, 1914 (discharge, 8.7 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice.

Digitized by Google

DIVERSIONS.—None above the station.
REGULATION.—None.
ACCURACY.—Results good.
COOPERATION.—Gage-height record furnished by Yosemite Power Co., through H. A. Kluegel, chief engineer.

Discharge measurements of South Fork of Tuolumne River near Sequoia, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 21	Charles Leidl.....	2.99	289	July 28	H. D. McGlashan.....	1.56	31
July 3	H. J. Tompkins.....	2.00	74				

Daily discharge, in second-feet, of South Fork of Tuolumne River near Sequoia, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	8.7	13	10	15	118	76	171	194	491	89	26	13
2	8.7	14	11	15	182	69	182	160	470	92	26	13
3	8.7	13	17	16	74	69	182	171	392	82	26	13
4	8.7	13	19	18	57	74	194	194	339	74	26	13
5	8.7	12	18	19	52	69	171	206	356	66	26	13
6	8.7	11	14	19	49	66	148	194	430	64	26	13
7	8.7	11	16	16	44	75	148	206	450	64	26	13
8	8.7	10	11	17	98	75	142	232	450	64	20	13
9	8.7	10	13	23	144	77	144	246	392	62	20	13
10	8.7	10	18	18	112	71	171	232	339	58	19	13
11	8.7	9.6	16	19	89	69	194	322	246	55	19	13
12	8.7	9.6	13	19	63	70	219	322	260	53	19	13
13	8.7	9.6	18	18	55	71	206	920	206	52	19	13
14	8.7	9.6	13	66	54	86	194	512	232	49	19	13
15	8.7	9.6	13	32	54	101	182	430	232	45	19	13
16	8.7	9.6	19	22	118	114	206	450	219	43	19	13
17	8.7	9.6	19	22	232	130	246	804	182	43	19	13
18	8.7	9.6	16	22	144	132	260	603	182	43	19	13
19	8.7	9.6	16	22	106	136	290	470	171	41	15	10
20	26	9.6	18	20	98	144	290	374	160	39	15	10
21	22	9.6	16	19	79	144	306	339	156	38	15	10
22	12	9.6	18	18	75	156	260	322	150	35	16	10
23	10	9.6	18	18	71	160	246	339	144	34	16	10
24	9.6	9.6	17	17	69	160	206	491	130	34	16	10
25	11	9.6	17	20	70	156	206	411	121	32	16	13
26	11	9.6	17	18	70	150	194	430	112	30	16	13
27	10	9.6	16	33	71	129	182	580	107	30	16	13
28	9.6	13	16	82	86	374	194	557	101	30	16	13
29	9.6	13	15	160	.....	290	232	450	96	30	13	13
30	18	10	15	76	.....	206	219	470	92	30	13	13
31	14	.....	15	62	.....	182	.....	512	.....	30	13	.....

NOTE.—Discharge determined from a rating curve well defined below 400 second-feet.

Digitized by Google

Monthly discharge of South Fork of Tuolumne River near Sequoia, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	26	8.7	10.6	652	B.
November	14	9.6	10.5	625	B.
December	19	10	15.7	965	A.
January	160	15	31.0	1,910	A.
February	232	44	90.5	5,030	A.
March	374	66	125	7,690	A.
April	306	142	206	12,300	A.
May	920	160	392	24,100	B.
June	491	92	247	14,700	A.
July	92	30	49.4	3,040	A.
August	26	13	19.0	1,170	A.
September	13	10	12.4	738	B.
The year	920	8.7	101	72,900	

GOLDEN ROCK DITCH NEAR SEQUOIA, CAL.

LOCATION.—In sec. 35, T. 1 S., R. 18 E., about 800 feet below diversion dam on South Fork of Tuolumne River, and 4 miles west of Sequoia, Tuolumne County.

RECORDS AVAILABLE.—January 1, 1914, to June 30, 1915.

GAGE.—Vertical staff fastened to left side of flume 800 feet below headgate; read once a day by an employee of Yosemite Power Co.

DISCHARGE MEASUREMENTS.—Made from foot plank across flume at gage.

CHANNEL AND CONTROL.—Rectangular wooden flume in cut.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.0 feet a number of times this season (discharge, 34 second-feet); no flow November 14 to 22.

ACCURACY.—Results good.

COOPERATION.—Gage-height record furnished by Yosemite Power Co., through H. A. Kluegel, chief engineer.

The water is now used for irrigation around Groveland, but was formerly used for mining.

Discharge measurements of Golden Rock ditch near Sequoia, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 30	Yosemite Power Co....	1.35	13.8	July 6	H. J. Tompkins.....	1.65	23
Apr. 21	Charles Leidl.....	1.95	31				

Digitized by Google

Daily discharge, in second-feet, of Golden Rock ditch near Sequoia, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	a 6.6	11	10	13	31	a 26	20	a 30	34
2	6.2	14	a 11	13	a 30	26	26	29	a 34
3	6.2	11	11	a 13	29	27	27	29	34
4	a 6.9	11	21	a 14	a 28	27	26	a 30	a 34
5	7.6	11	a 18	15	26	a 26	27	31	34
6	a 7.8	10	a 16	15	26	26	a 27	29	a 34
7	8.0	a 9.7	14	13	26	a 26	27	a 30	34
8	8.0	a 9.4	a 14	a 12	27	26	27	31	a 34
9	8.0	9.1	13	11	32	26	a 28	31	34
10	a 8.0	a 9.1	a 13	18	a 30	a 26	29	a 31	34
11	8.0	a 9.1	13	14	27	26	31	32	a 32
12	a 7.1	a 9.1	10	a 14	27	26	31	a 32	31
13	6.2	9.1	a 9	14	a 27	26	a 31	31	31
14	6.2	.0	8	a 19	27	a 26	a 32	a 31	a 31
15	a 6.2	.0	15	24	a 28	27	32	32	31
16	6.2	.0	13	21	29	27	34	a 33	31
17	a 6.8	.0	15	15	a 30	27	34	34	a 30
18	a 7.4	.0	a 14	13	31	29	a 34	a 24	29
19	8.0	.0	13	a 16	29	27	34	15	a 28
20	a 12	.0	a 12	18	a 28	29	a 33	a 15	27
21	15	.0	11	a 16	27	29	32	15	27
22	a 12	.0	a 13	15	a 27	a 29	a 32	a 20	a 27
23	10	8.0	15	a 15	27	29	32	24	26
24	a 10	a 8.0	8.4	16	a 27	31	31	a 26	26
25	a 10	8.0	13	18	27	31	31	29	a 25
26	10	a 8.0	13	a 20	27	31	a 31	a 28	24
27	a 10	8.0	a 13	21	26	a 32	31	27	a 24
28	10	a 8.0	a 12	24	a 26	34	31	27	24
29	a 12	a 8.0	12	31	.....	a 27	a 31	a 28	a 24
30	14	8.0	13	31	.....	20	31	29	24
31	12	.....	13	a 31	.....	a 20	.....	34	.....

a Interpolated.

NOTE.—Discharge determined from a well-defined rating curve. No record July 1 to Sept. 30.

Monthly discharge of Golden Rock ditch near Sequoia, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	15	6.2	8.79	540	A.
November	14	.0	6.55	390	A.
December	21	8	12.9	793	A.
January	31	11	17.5	1,080	B.
February	32	26	27.9	1,550	A.
March	34	20	27.3	1,680	B.
April	34	20	30.1	1,790	A.
May	34	15	28.0	1,720	A.
June	34	24	29.7	1,770	A.
The period	.....	.....	.....	11,300	

SOUTH FORK OF TUOLUMNE RIVER NEAR GROVELAND, CAL.

LOCATION.—At South Fork trail bridge, in Stanislaus National Forest, one-fourth mile above junction with Tuolumne River, about 10 miles east of Groveland, Tuolumne County. The Middle Fork enters about 2½ miles above the station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 13, 1910, to September 30, 1915 (very fragmentary).

GAGE.—Inclined staff fastened to a large boulder on right bank about 600 feet above trail bridge. Previous to May 19, 1914, gage was a vertical staff on middle pier

Digitized by Google

of bridge at downstream end, and at same datum. Gage read by forest ranger George Adams, when passing the station.

DISCHARGE MEASUREMENTS.—Made from car and cable 20 feet above bridge, or by wading.

CHANNEL AND CONTROL.—Composed of boulders and gravel; very rough.

EXTREMES OF STAGE.—1910–1915: Maximum stage recorded, between 8 and 10 feet, January 25, 1914. A camper at the bridge said that on that date the water touched the under stringers of the foot-bridge. Minimum stage recorded, 0.35 foot August 24, 1912.

WINTER FLOW.—Stage-discharge relation probably not affected by ice.

DIVERSIONS.—At Hardin ranch, 7 miles above the mouth, water is diverted for irrigation.

REGULATION.—A small amount of storage is developed at Hardin ranch.

ACCURACY.—Results good for days when gage was read.

COOPERATION.—Gage-height record furnished by United States Forest Service.

The following discharge measurement was made by Charles Leidl:
April 22, 1915: Gage height, 5.18 feet; discharge, 501 second-feet.

Daily discharge, in second-feet, of South Fork of Tuolumne River near Groveland, Cal., for the year ending Sept. 30, 1915.

Day.	Dec.	Jan.	Apr.	July.	Aug.	Sept.	Day.	Dec.	Jan.	Apr.	July.	Aug.	Sept.
1	.....	.....	.....	.....	.....	.....	16	.....	.....	.....	.....	20	.....
2	.....	.....	.....	.....	.....	8.5	17	.....	.....	.....	.....	.....	.....
3	.....	.....	.....	.....	.....	.....	18	.....	.....	.....	.....	.....	.....
4	.....	.....	.....	.....	.....	.....	19	.....	.....	.....	.....	.....	.....
5	.....	.....	.....	.....	29	.....	20	.....	.....	.....	60	.....	.....
6	.....	.....	.....	.....	.....	.....	21	.....	.....	.....	.....	.....	8.5
7	.....	.....	.....	.....	.....	.....	22	.....	.....	501	.....	.....	.....
8	.....	.....	.....	.....	.....	.....	23	.....	.....	.....	.....	.....	.....
9	.....	.....	.....	.....	.....	.....	24	.....	.....	.....	.....	.....	.....
10	.....	.....	.....	.....	.....	.....	25	.....	.....	.....	.....	.....	.....
11	.....	.....	.....	.....	.....	.....	26	.....	.....	.....	.....	.....	.....
12	.....	.....	.....	.....	.....	.....	27	.....	.....	.....	.....	.....	.....
13	.....	.....	.....	.....	.....	.....	28	.....	.....	.....	.....	.....	.....
14	.....	146	.....	.....	.....	.....	29	.....	.....	.....	.....	.....	.....
15	.....	.....	.....	.....	.....	.....	30	18	.....	.....	.....	.....	.....
							31	.....	.....	.....	34	.....	.....

NOTE.—Discharge determined from a well-defined rating curve.

YOSEMITE POWER CO.'S CANAL NEAR LA GRANGE, CAL.

LOCATION.—In the SW. ¼ sec. 16, T. 3 S., R. 14 E., at the short flume opposite La Grange dam, just above waste gate, about three-fourths mile above power house, 1¼ miles northeast of La Grange, Stanislaus County, and about 13¾ miles below intake.

RECORDS AVAILABLE.—1908 to September 30, 1915 (not complete).

GAGE.—Enameled vertical staff on right side of flume near upper end; read once a day by H. T. Sackett.

DISCHARGE MEASUREMENTS.—Made in flume just below gage.

CHANNEL AND CONTROL.—Rectangular ditch excavated mostly in shale rock.

EXTREMES OF DISCHARGE.—1910–1915: Maximum stage recorded, full head, 2.9 feet (discharge, 66 second-feet) occurs at various times of most every year; no flow during periods of every year.

ACCURACY.—Results excellent.

COOPERATION.—Gage-height record furnished by Turlock Irrigation District through R. V. Meikle, chief engineer.

Digitized by Google

The Yosemite Power Co.'s canal takes water from the south side of Tuolumne River at Indian Bar, in the SW. ¼ sec. 6, T. 2 S., R. 15 E., about 15 miles above the town of La Grange. This canal was built in the early days to supply water for hydraulic mining in the vicinity of La Grange, and is now locally known as the "La Grange mining ditch." Recently it has been thoroughly repaired and is now used as a supply canal for the new hydroelectric plant which was installed in the latter part of 1907. The power house is situated on the left bank of the river about half a mile above the town of La Grange and is below the dam and headworks of the Turlock and Modesto irrigation canals.

Discharge measurements of Yosemite Power Co.'s canal near La Grange, Cal., during the year ending Sept. 30, 1915.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Mar. 20	2.85	67	Aug. 2	2.75	60
22	2.85	65			

Daily discharge, in second-feet, of Yosemite Power Co.'s canal near La Grange, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	62	62	62	62	38	56	59	62	62	62	62	62
2	62	62	62	66	29	56	59	62	66	62	62	62
3	62	62	62	62	26	56	59	62	62	62	62	62
4	62	62	[illegible]	53	41	56	62	62	66	62	62	62
5	62	62	[illegible]	59	56	59	62	62	66	62	62	62
6	62	62	56	59	62	62	53	62	66	62	62	62
7	62	62	5.2	59	62	62	62	62	66	62	62	62
8	62	62	59	62	62	62	62	62	66	62	62	62
9	62	0	62	44	32	62	62	62	0	62	62	59
10	62	18	56	14	32	62	9	62	62	62	62	62
11	62	62	62	62	32	62	62	62	62	62	22	59
12	62	62	59	29	50	62	62	62	62	62	62	62
13	0	62	62	62	59	62	62	62	62	62	62	62
14	47	62	62	53	59	62	62	62	62	62	62	62
15	62	62	2	59	62	62	62	62	62	62	59	62
16	0	62	62	10	53	36	62	62	62	62	62	0
17	62	62	62	62	50	62	62	62	62	62	62	59
18	62	62	62	62	56	62	4.5	59	62	62	62	59
19	62	62	62	62	56	62	0	59	62	62	62	59
20	62	62	62	62	44	62	62	62	62	62	62	0
21	62	62	62	62	50	62	62	62	62	62	62	0
22	62	62	62	62	50	62	62	62	62	62	62	59
23	62	62	62	62	50	62	62	62	62	31	62	62
24	62	62	62	62	53	62	62	62	62	62	62	62
25	62	62	64	50	50	62	62	62	62	62	62	62
26	62	62	66	59	56	62	0	62	62	62	62	62
27	62	62	62	62	59	62	62	62	62	62	62	62
28	62	62	62	50	50	62	62	62	62	62	62	62
29	62	62	62	38	.....	35	62	62	62	0	62	62
30	62	62	62	38	.....	56	62	62	62	62	62	59
31	62	.....	62	38	.....	62	.....	62	.....	62	62	.....

NOTE.—Discharge determined from a well-defined rating curve. No gage readings Dec. 25, May 25, June 5, Aug. 7 and Sept. 14; discharge interpolated. No reading Sept. 19; discharge estimated.

Digitized by Google

Monthly discharge of Yosemite Power Co.'s canal near La Grange, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	62	0.0	57.5	3,540	A.
November	62	.0	58.5	3,480	A.
December	66	2	57.6	3,540	A.
January	66	10	53.1	3,260	A.
February	62	26	49.2	2,730	A.
March	62	35	59.2	3,640	A.
April	62	.0	53.6	3,190	A.
May	62	59	61.8	3,800	A.
June	66	.0	60.7	3,610	A.
July	62	.0	59.0	3,630	A.
August	62	22	60.6	3,730	A.
September	62	.0	55.1	3,280	B.
The year	66	.0	57.2	41,400	

MODESTO CANAL NEAR LA GRANGE, CAL.

LOCATION.—In the SE. ¼ sec. 17, T. 3 S., R. 14 E., below waste gates and 460 feet below intake at La Grange dam on Tuolumne River, and about 1¼ miles northeast of La Grange, Stanislaus County. Canal is on right bank of river.

RECORDS AVAILABLE.—April 26, 1903, to September 30, 1915.

GAGE.—Vertical iron staff in concrete well on left bank; read twice a day and operation of head gates noted by E. A. Townsend. Gage and its position have remained unchanged since beginning of record.

DISCHARGE MEASUREMENTS.—Made from footbridge 550 feet below gage. This section of canal is lined with concrete.

CHANNEL AND CONTROL.—Canal is concrete lined and control is length of canal. For the last couple of years, timber flumes that composed the canal a mile or more below the station, have been gradually replaced by fills with concrete lining; and the cross section was increased. The discharge per foot stage above 1.5 feet has been increased.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and period 1903–1915, 4.2 feet from June 8 to July 17, 1915 (discharge 7.48 second feet); no flow during periods in every year.

ACCURACY.—No débris deposited in canal throughout year; record of operation of head gates satisfactory; results excellent.

COOPERATION.—Gage-height record furnished by Modesto irrigation district, through F. A. Townsend, patrolman.

The water is used for irrigation in the Modesto irrigation district.

Discharge measurements of Modesto canal near La Grange, Cal., during the year ending Sept. 30, 1915.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Mar. 21	3.80	660	Mar. 23	3.29	568
23	.94	91	May 4	4.00	697
23	1.96	289	Aug. 24	.72	55
23	2.60	430			

Digitized by Google

Daily discharge, in second-feet, of Modesto canal near La Grange, Cal., for the year ending Sept. 30, 1915.

Day.	Nov.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		0.0	42	22	687	666	646	748	216	44
2		.0	42	.0	687	666	666	748	195	42
3		36	42	65	687	708	708	748	185	44
4		9.5	42	246	687	708	708	748	185	44
5		.0	42	298	687	708	728	748	169	42
6		.0	42	298	687	708	728	748	155	42
7		.0	42	298	605	708	531	748	155	42
8		.0	42	298	502	708	748	748	147	42
9		.0	23	380	502	708	748	748	143	36
10		.0	.0	400	482	708	748	748	131	36
11		.0	.0	441	400	708	748	748	131	29
12		49	.0	523	400	708	748	748	124	30
13		42	105	544	400	666	748	748	120	30
14		42	441	544	317	666	748	748	124	30
15		42	336	544	400	666	748	748	107	.0
16		30	544	544	420	666	748	748	106	.0
17		.0	605	544	482	584	748	748	111	.0
18		42	544	605	502	564	748	708	87	.0
19		42	151	646	564	523	748	584	80	5
20		42	.0	666	584	523	748	502	71	33
21		42	.0	666	564	523	748	482	67	48
22		35	.0	666	564	523	748	584	61	33
23		.0	.0	564	564	523	748	626	57	30
24		.0	.0	666	584	523	748	687	58	26
25		25	.0	687	626	523	748	687	55	26
26	1.2	42	.0	687	626	564	748	502	62	26
27	1.6	42	.0	687	605	564	748	400	58	30
28		42	31	687	626	584	748	359	50	30
29		42		626	626	605	748	359	49	29
30		42		687	646	605	748	267	39	28
31		42		687		626		246	38	

NOTE.—Discharge determined from a well-defined rating curve. No flow Oct. 1 to Nov. 25 and Nov. 28 to Jan. 2.

Monthly discharge of Modesto canal near La Grange, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	0	0	0	0	
November	1.6	0	.09	5	
December	0	0	0	0	
January	49	0	23.6	1,450	A.
February	605	0	111	6,160	A.
March	687	0	491	30,200	A.
April	687	317	557	33,100	A.
May	708	523	627	38,600	A.
June	748	531	731	43,500	A.
July	748	246	636	39,100	A.
August	216	38	108	6,640	A.
September	48	0	29.2	1,740	A.
The year	748	0	277	200,000	

TURLOCK CANAL NEAR LA GRANGE, CAL.

LOCATION.—In the SW. ¼ sec. 16, T. 3 S., R. 14 E., just below spillway and about 150 feet below intake tunnel which takes water from Tuolumne River above La Grange dam; and about 1¼ miles northeast of La Grange, Stanislaus County. Canal is on left bank of river.

RECORDS AVAILABLE.—July, 1899, to September 30. 1915.

Digitized by Google

GAGE.—Vertical staff float in concrete well; read by H. T. Sackett.

DISCHARGE MEASUREMENTS.—Made from foot plank across lined section of canal at Snake Ravine, about 1 mile below gage.

CHANNEL AND CONTROL.—Cut partially lined and fill completely lined. Control is length of channel.

EXTREMES OF DISCHARGE.—1907–1915: Maximum mean daily discharge, 1,610 second-feet, July 14 and 15, 1915; no flow during periods of every year. Capacity of canal is about 1,800 second-feet.

COOPERATION.—Daily-discharge record February 1 to August 31 furnished in acre-feet by Turlock irrigation district through R. V. Meikle, chief engineer.

The water is used to irrigate 95,698 acres of the Turlock irrigation district.

Discharge measurements of Turlock canal near La Grange, Cal., during the year ending Sept. 30, 1915.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Mar. 21	1.36	17	Mar. 23	6.40	1,140
22	2.80	148	May 3	7.30	1,380
22	4.16	413	4	4.92	665
23	5.10	698	Aug. 24	2.65	123

Daily discharge, in second-feet, of Turlock canal near La Grange, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	114	10	345	909	1,300	749	1,510	357	86
2	108	10	380	909	1,370	849	1,550	432	90
3	102	5	458	899	1,480	853	1,530	397	91
4	96	5	458	774	1,480	857	1,570	378	91
5	70	0	458	771	1,480	0	1,530	364	.....
6	74	0	525	886	1,480	771	1,550	354	.....
7	61	63	599	886	1,460	849	1,580	320	.....
8	53	63	599	872	1,460	1,080	1,580	308	.....
9	53	0	649	834	1,440	1,240	1,570	290	.....
10	57	20	673	834	1,440	314	1,600	256	.....
11	.....	0	722	673	1,420	932	1,600	238	.....
12	.....	0	821	663	1,280	1,370	1,590	229	.....
13	.....	0	928	649	1,300	1,460	1,600	211	.....
14	.....	0	932	652	1,280	1,500	1,610	202	.....
15	.....	0	932	663	1,300	1,480	1,610	188	.....
16	.....	160	886	652	1,280	1,460	265	174	.....
17	.....	160	863	663	1,260	1,440	822	172	.....
18	.....	247	799	665	921	1,400	822	181	.....
19	.....	247	821	649	899	1,510	1,490	164	.....
20	.....	238	871	699	1,080	1,510	1,490	154	.....
21	.....	238	582	652	1,210	1,520	1,400	140	.....
22	.....	247	582	722	1,220	1,510	1,580	132	.....
23	.....	247	619	771	1,210	1,460	1,580	126	.....
24	.....	247	1,080	761	1,080	1,400	1,590	124	.....
25	.....	247	1,210	771	921	1,500	1,600	120	.....
26	.....	345	932	871	871	1,490	1,440	121	.....
27	.....	345	899	921	859	1,500	1,330	125	.....
28	.....	345	886	1,260	859	1,500	846	111	.....
29	.....	.....	799	1,260	834	1,500	661	101	.....
30	.....	.....	871	1,300	834	1,500	604	91	.....
31	.....	.....	983	.....	821	.....	529	91	.....

NOTE.—Discharge Oct. 1–10 determined from a well-defined rating curve and one gage-height reading a day; Feb. 1 to Aug. 31 furnished by the Turlock irrigation district; and Sept. 1–4 estimated by U. S. Geological Survey from one gage-height reading a day and the statement made by R. V. Meikle of the district that 90 second-feet was running. Canal dry Oct. 11 to Jan. 31 and Sept. 5–30.

Digitized by Google

Monthly discharge of Turlock canal near La Grange, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	114	0	25.4	1,560
November	0	0	0	0
December	0	0	0	0
January	0	0	0	0
February	345	0	125	6,940
March	1,210	345	747	45,900
April	1,300	649	816	48,600
May	1,480	821	1,200	73,800
June	1,520	0	1,220	72,600
July	1,610	265	1,340	82,400
August	432	91	215	13,200
September	91	0	11.9	708
The year	1,610	0	477	346,000

NOTE.—Monthly and yearly discharge computed by engineers of the U. S. Geological Survey.

MIDDLE FORK OF STANISLAUS RIVER AT SAND BAR FLAT, NEAR AVERY, CAL.

LOCATION.—At Sand Bar Flat, in Tuolumne County, about 3 miles below Bakers Crossing, 11 miles above junction with North Fork of Stanislaus River, and 11 miles southeast of Avery, Calaveras County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 1, 1905, to September 30, 1915.

GAGE.—Staff showing depth of water over crest of dam. There is also a staff in flume below dam.

DISCHARGE.—Flow over dam computed from formula developed by company. Current meter measurements made in flume. Discharge, as published, is combined flow of river over dam and discharge of flume.

CHANNEL AND CONTROL.—See information under "Discharge."

EXTREMES OF DISCHARGE.—1905–1910 and 1912–1915: Maximum mean daily discharge, 9,760 second-feet, March 19, 1907; minimum mean daily discharge, 50 second-feet, November 22, 1905.

WINTER FLOW.—No information.

DIVERSIONS.—None.

REGULATION.—Relief reservoir, on Relief Creek about 1 mile above the mouth of the creek, has a capacity of 16,000 acre-feet.

COOPERATION.—Daily-discharge record furnished by Sierra & San Francisco Power Co., through H. F. Jackson, general manager.

Digitized by Google

Daily discharge, in second-feet, of Middle Fork of Stanislaus River at Sand Bar Flat, near Avery, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	214	226	202	89	445	394	1,100	1,640	4,420	2,150	484	251
2	212	211	128	90	519	356	1,240	1,410	4,020	2,220	478	254
3	211	205	102	91	402	339	1,590	1,360	3,570	2,260	474	246
4	209	219	124	102	319	338	1,720	1,350	3,000	2,190	454	244
5	208	222	112	91	326	368	1,460	1,360	3,000	2,060	437	230
6	213	219	112	93	319	328	1,240	1,420	3,280	1,630	430	219
7	215	226	114	97	64	249	1,300	1,490	3,730	1,390	398	248
8	210	221	124	88	371	263	1,200	1,780	3,990	1,440	361	250
9	210	215	99	95	383	284	1,350	1,820	3,960	1,640	328	251
10	205	228	132	80	371	359	1,600	2,160	3,670	1,660	340	245
11	199	234	126	93	279	390	1,890	3,580	3,370	1,690	312	248
12	197	233	128	99	194	385	2,120	3,210	2,740	1,790	259	240
13	214	232	114	93	194	404	2,440	3,530	2,390	1,590	250	249
14	216	230	127	190	187	495	1,810	2,660	2,320	1,440	242	250
15	221	233	97	110	192	576	1,770	2,510	2,560	1,260	252	253
16	226	228	136	88	215	682	2,030	2,930	2,710	1,040	248	251
17	233	235	153	118	628	792	2,470	3,660	2,550	1,050	214	252
18	234	235	137	100	535	883	2,730	2,980	2,430	988	237	250
19	232	234	124	101	490	898	2,940	2,650	2,460	1,000	229	249
20	233	233	133	100	490	955	3,010	2,400	2,290	967	226	251
21	231	234	119	101	390	1,040	2,760	2,140	2,200	974	247	250
22	206	229	123	97	351	1,140	2,560	2,200	2,300	1,160	247	253
23	214	233	121	93	346	1,270	2,530	2,470	2,370	1,300	256	252
24	234	234	120	95	327	1,370	2,290	2,720	2,320	1,130	255	252
25	233	222	126	100	325	1,400	2,040	2,410	2,170	932	245	256
26	223	202	123	94	620	1,290	1,910	2,500	1,920	844	203	256
27	233	207	105	103	367	1,040	1,900	2,720	1,880	689	241	256
28	233	206	91	151	463	1,400	2,230	3,750	2,010	584	244	257
29	234	220	92	199	.....	1,290	2,090	3,880	2,150	534	242	253
30	262	193	90	171	.....	1,110	1,880	3,690	2,210	535	243	241
31	255	.....	88	164	.....	1,000	.....	4,050	.....	532	246	.....

Monthly discharge of Middle Fork of Stanislaus River at Sand Bar Flat, near Avery, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	262	197	222	13,600
November	235	193	223	13,300
December	202	88	120	7,380
January	199	80	109	6,700
February	628	64	350	19,400
March	1,400	249	745	45,800
April	3,010	1,100	1,970	117,000
May	4,050	1,350	2,530	156,000
June	4,420	1,880	2,800	167,000
July	2,290	532	1,310	80,600
August	484	203	301	18,500
September	257	219	249	14,800
The year	4,420	64	911	660,000

NOTE.—Monthly and yearly discharge computed by engineers of the U. S. Geological Survey.

Digitized by Google

STANISLAUS RIVER AT KNIGHTS FERRY, CAL.

LOCATION.—In the NE. ¼ sec. 29, T. 1 S., R. 12 E., at Knights Ferry, Stanislaus County, 12 miles northeast of Oakdale, and about 25 miles below mouth of South Fork.

DRAINAGE AREA.—935 square miles.

RECORDS AVAILABLE.—May 19, 1903, to September 30, 1915. From May 3, 1895, to February 16, 1901, a station was maintained one-half mile north of Oakdale.

GAGE.—Staff in five sections on right bank—two vertical and three inclined; read twice a day by E. J. Coop. The original gage datum has been maintained, although several changes have been made in the gage. Zero of gage is 157.53 feet above sea level, United States Geological Survey datum.

DISCHARGE MEASUREMENTS.—Made from cable (Pl. VI, *A*, p. 166) 50 feet upstream from gage or by wading.

CHANNEL AND CONTROL.—Small boulders and gravel; slightly shifting during high water. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.8 feet at 7 a. m. May 13 (discharge, 11,100 second-feet); minimum stage recorded, 4.06 feet October 19 to 21 (estimated discharge, 4 second-feet).

1903–1915: Maximum stage recorded, 26.0 feet at 4 a. m. January 31, 1911 (discharge, 60,000 second-feet); no flow December 3 to 5, 1912.

DIVERSIONS.—Ditches diverting water for mining purposes are numerous above the station. Water is also diverted from the South Fork into the Tuolumne basin and from the North Fork for use in the vicinity of Murphy and Angels (see Utica Gold Mining Co.'s canal near Avery). The South San Joaquin canal [1] heads on the right bank and the Oakdale canal on the left bank at Goodwin dam, 4 miles above Knights Ferry (gaging stations are maintained on these canals near their intakes.) Some power is occasionally developed at Knights Ferry above the station. The water diverted for power purposes on Middle Fork at Sand Bar Flat near Avery is returned to the river several miles above this station.

REGULATION.—Storage is developed in Middle Fork (see Relief Creek near Baker Station), North Fork and South Fork drainages.

ACCURACY.—Results good. The total flow of river at this point is determined by combining the discharge at the river gaging station with the discharge of South San Joaquin and Oakdale canals. Results affected by many small diversions for irrigation and mining purposes.

Discharge measurements of Stanislaus River at Knights Ferry, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 6	Charles Leidl	5.41	308	June 9	Charles Leidl	11.06	7,720
Feb. 20	H. J. Tompkins	9.61	4,200	Aug. 27	do	4.32	9.2
May 22	Charles Leidl	9.29	4,400				

[1] This canal serves lands previously irrigated from Stanislaus & San Joaquin Water Co.'s canal (now abandoned) and furnishes water for domestic purposes at Knights Ferry, replacing Schell's ditch.

Digitized by Google

Daily discharge, in second-feet, of Stanislaus River at Knights Ferry, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	15	460	245	129	4,730	1,530	1,350	2,170	9,010	2,050	45	14
2	15	184	205	135	5,060	1,180	1,350	1,720	8,350	2,050	45	14
3	15	249	205	120	4,280	940	1,940	1,350	6,860	2,380	50	14
4	15	269	245	225	1,930	800	2,530	1,100	5,700	2,490	50	14
5	15	265	294	205	1,360	730	1,940	1,260	5,350	2,050	50	14
6	15	285	308	308	940	700	1,530	1,260	5,520	1,370	50	14
7	13	285	237	550	820	700	1,440	1,530	7,280	840	48	14
8	13	217	205	550	1,180	640	1,530	2,050	7,700	665	46	14
9	13	245	213	330	6,140	535	1,440	2,050	7,490	805	16	14
10	13	285	285	330	6,520	610	1,830	4,170	6,460	875	16	14
11	11	205	490	265	2,770	560	2,530	6,100	5,880	982	19	14
12	11	233	380	316	1,440	560	3,280	6,300	4,420	945	19	14
13	11	245	281	316	1,020	560	3,710	9,310	3,480	982	19	14
14	11	205	209	1,260	730	610	2,530	6,460	3,090	805	21	14
15	11	245	205	715	700	730	2,290	5,520	3,610	700	16	19
16	11	245	205	460	585	1,060	3,150	7,070	3,610	500	14	14
17	11	245	285	326	3,420	1,180	4,170	8,130	3,350	344	14	14
18	11	225	321	290	3,280	1,350	4,990	7,280	3,090	188	14	14
19	4	205	303	277	2,170	1,350	5,520	5,880	3,090	173	14	14
20	4	205	520	261	2,890	1,440	5,900	4,860	2,840	184	14	14
21	4	213	281	245	2,410	1,260	4,820	4,140	2,490	173	14	14
22	20	205	245	269	1,720	1,620	4,330	4,280	2,490	114	14	14
23	90	198	205	249	1,620	1,720	4,170	5,020	2,720	300	14	14
24	32	205	193	229	1,350	1,830	3,020	5,180	2,600	173	14	14
25	25	205	181	330	1,100	1,940	2,890	5,020	2,380	98	14	14
26	15	205	170	294	980	1,720	2,770	4,860	2,050	43	14	14
27	13	205	170	340	835	1,440	2,650	6,660	1,650	40	10	14
28	11	205	170	2,690	2,530	2,050	3,560	8,130	1,750	40	14	14
29	11	205	135	1,730	.....	2,770	3,280	7,910	1,850	40	14	14
30	152	205	120	1,630	.....	1,830	2,890	7,280	2,050	40	14	14
31	285	.....	129	1,440	.....	1,440	.....	7,910	.....	45	14	.....

NOTE.—Discharge determined from three rating curves as follows: Oct. 1 to Feb. 10, fairly well defined below 6,000 second-feet; Feb. 11 to May 13, fairly well defined; May 14 to Sept. 30, well defined. Daily discharge Oct. 19–21 estimated from gage-height record and current-meter measurement of Aug. 27, 1914; July 27 to Aug. 3 estimated; Dec. 24, 25, July 17, Aug. 19, 23, 24, and Sept. 12, interpolated.

Monthly discharge of Stanislaus River at Knights Ferry, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	285	4	28.9	1,780	D.
November	460	184	235	14,000	B.
December	520	120	246	15,100	B.
January	2,690	120	542	33,300	B.
February	6,520	585	2,300	128,000	B.
March	2,770	535	1,210	74,400	B.
April	5,900	1,350	2,980	177,000	B.
May	9,310	1,100	4,900	301,000	B.
June	9,010	1,650	4,270	254,000	A.
July	2,490	.....	725	44,600	B.
August	50	10	23.5	1,440	D.
September	19	14	14.2	845	C.
The year	9,310	4	1,450	1,050,000	

Digitized by Google

Combined daily discharge, in second-feet, of Stanislaus River and two canals near Knights Ferry, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	241	460	254	160	4,730	1,530	1,590	2,680	9,570	3,010	512	280
2	243	184	214	166	5,060	1,180	1,730	2,250	8,950	3,010	471	295
3	243	249	214	151	4,280	940	2,320	1,970	7,600	2,950	482	298
4	238	269	254	256	1,930	800	2,910	1,800	6,480	2,770	470	295
5	235	265	303	444	1,360	730	2,320	1,960	6,110	2,800	477	298
6	238	285	317	531	940	700	1,910	1,960	6,280	2,280	447	280
7	236	285	246	773	820	700	1,810	2,250	7,960	1,750	442	274
8	241	217	214	773	1,180	640	1,890	2,760	8,450	1,580	437	280
9	241	245	222	553	6,140	535	1,800	2,760	8,300	1,720	328	292
10	239	285	293	553	6,520	610	2,190	4,900	7,420	1,790	323	274
11	239	205	555	488	2,770	560	2,890	6,760	6,850	1,890	338	280
12	234	233	380	539	1,440	688	3,650	6,880	5,370	1,860	338	315
13	234	245	281	539	1,020	743	4,080	9,910	4,460	1,720	335	280
14	237	205	209	1,480	730	793	2,890	7,040	4,070	1,550	322	303
15	234	245	205	938	700	925	2,650	6,100	4,590	1,440	309	306
16	203	245	205	460	585	1,260	3,510	7,660	4,600	1,240	382	442
17	247	259	285	326	3,420	1,380	4,550	8,730	4,350	1,080	265	310
18	269	239	321	290	3,280	1,540	5,370	7,880	4,090	929	286	310
19	262	219	303	277	2,170	1,580	5,970	6,460	4,090	901	286	318
20	273	219	520	261	2,890	1,750	6,460	5,440	3,840	920	315	298
21	284	227	281	245	2,410	1,590	5,390	4,730	3,490	914	307	292
22	369	219	245	269	1,720	1,820	4,900	4,870	3,480	845	292	304
23	359	212	205	249	1,620	1,920	4,740	5,610	3,760	1,130	280	292
24	279	214	193	229	1,350	2,150	3,580	5,780	3,590	1,080	283	292
25	272	210	197	330	1,100	2,190	3,390	5,610	3,340	990	274	295
26	262	210	198	294	980	1,900	2,980	5,430	3,010	800	292	310
27	260	210	201	340	835	1,710	2,960	7,300	2,610	695	270	289
28	258	210	201	2,740	2,660	2,330	4,010	8,740	2,710	650	286	292
29	155	214	166	2,010	.....	3,050	3,730	8,520	2,810	609	298	298
30	152	214	151	1,630	.....	2,010	3,350	7,960	3,010	514	274	298
31	285	.....	160	1,440	.....	1,620	.....	8,600	.....	512	280	.....

NOTE.—See p. 201 for daily-discharge table of Oakdale canal, and p. 199 for that of South San Joaquin canal.

Combined monthly discharge of Stanislaus River and two canals near Knights Ferry, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	369	152	250	15,400
November	460	184	240	14,300
December	555	151	258	15,900
January	2,740	151	637	39,200
February	6,520	585	2,310	128,000
March	3,050	535	1,350	83,000
April	6,460	1,590	3,380	201,000
May	9,910	1,800	5,530	340,000
June	9,570	2,610	5,170	308,000
July	3,010	512	1,480	91,000
August	512	265	345	21,200
September	442	274	300	17,900
The year	9,910	151	1,760	1,270,000

NOTE.—See p. 201 for monthly-discharge table of Oakdale canal, and p. 200 for that of South San Joaquin canal.

RELIEF RESERVOIR NEAR BAKER STATION, CAL.

LOCATION.—Dam is in the NW. ¼ sec. 13, T. 5 N., R. 20 E., on Relief Creek about five-eights mile above junction with East Fork, and about 3½ miles southeast of Baker Station, Tuolumne County.

DRAINAGE AREA.—Not measured.

Digitized by Google

RECORDS AVAILABLE.—October 1, 1910, to September 30, 1915.

GAGE.—No information.

EXTREMES OF STORAGE.—Maximum storage recorded 1910–1915: 15,200 acre-feet, July 2 to 13 and 26 to 31, 1913; reservoir empty during periods of every year.

COOPERATION.—Daily-storage record furnished by Sierra & San Francisco Power Co. through H. F. Jackson, general manager.

The reservoir is used for storage for power by the Sierra & San Francisco Power Co. The water is released down Relief Creek to the Middle Fork of Stanislaus River at Sand Bar Flat, where it is diverted. During the winter the reservoir gates are left open.

Storage, in acre-feet, in Relief reservoir near Baker Station, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	May.	June.	July.	Aug.	Sept.
1	10,800	6,100	960	0	3,520	11,900	14,900	13,300
2	10,700	6,010	960	0	3,730	12,200	14,900	13,200
3	10,400	5,920	960	67	3,900	12,200	15,000	13,000
4	10,200	5,790	947	71	4,090	12,300	15,000	12,900
5	10,100	5,660	955	78	4,320	12,300	15,000	12,700
6	9,920	5,520	925	122	4,590	12,400	15,000	12,600
7	9,720	5,360	907	188	4,990	12,700	15,000	12,300
8	9,560	5,200	877	257	5,280	12,700	15,000	12,100
9	9,410	5,020	841	260	5,590	12,900	15,000	11,900
10	9,250	4,820	813	276	5,770	13,100	15,000	11,900
11	9,250	4,670	782	491	5,910	13,400	15,000	11,400
12	8,880	4,450	749	435	6,040	13,500	15,000	11,200
13	8,700	4,230	710	473	6,240	13,700	15,000	11,000
14	8,490	4,070	672	532	6,510	13,800	15,000	10,800
15	8,280	3,860	631	620	6,970	13,900	14,900	10,600
16	8,040	3,670	586	744	7,260	14,000	14,900	10,300
17	7,800	3,500	523	884	7,460	14,200	14,900	10,000
18	7,600	3,270	462	1,030	7,840	14,300	14,900	9,750
19	7,450	3,070	398	1,150	8,200	14,400	14,900	9,490
20	7,310	2,860	350	1,220	8,430	14,500	14,800	9,220
21	7,180	2,640	296	1,320	8,930	14,600	14,700	8,970
22	7,110	2,420	245	1,450	9,110	14,800	14,600	8,680
23	6,990	2,230	191	1,720	9,520	14,800	14,500	8,400
24	6,830	2,020	133	1,820	10,100	14,800	14,400	8,120
25	6,700	1,870	67	1,950	10,000	14,900	14,400	7,860
26	6,560	1,660	0	1,920	10,200	14,900	14,200	7,610
27	6,380	1,500	0	2,400	10,500	14,800	14,100	7,350
28	6,240	1,360	0	2,660	11,000	14,900	14,000	7,080
29	6,090	1,220	0	2,840	11,500	14,900	13,800	6,850
30	6,090	1,070	0	3,100	11,700	14,900	13,700	6,600
31	6,100	.....	0	3,330	.....	14,900	13,500	.....

NOTE.—No water stored during the period Dec. 26 to May 2.

RELIEF CREEK NEAR BAKER STATION, CAL.

LOCATION.—In the NW. ¼ sec. 13, T. 5 N., R. 20 E., one-fourth mile below Relief reservoir of the Sierra & San Francisco Power Co., one-fourth mile above junction with East Fork, and about 3 miles southeast of Baker Station, Tuolumne County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October, 1910 to September 30, 1915 (incomplete).

GAGE.—No information.

DISCHARGE.—Computed from gage-height record at weir, which gives the combined flow over spillway and through outlet gates of dam.

CHANNEL AND CONTROL.—See preceding paragraph.

EXTREMES OF DISCHARGE.—1912–1915: Maximum mean daily discharge, 795 second-feet, June 23, 1914; no flow April 9 to May 25 and June 24 to 28, 1913.

Digitized by Google

WINTER FLOW.—No information.

DIVERSIONS.—None.

REGULATIONS.—See Relief reservoir.

COOPERATION.—Daily-discharge record furnished by Sierra & San Francisco Power Co., through H. F. Jackson, general manager.

Daily discharge, in second-feet, of Relief Creek below Relief reservoir, near Baker Station, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Apr.	May.	June.	July.	Aug.	Sept.
1	101	75	10.1	7.8	.....	79	320	270	59	107
2	101	75	10	7.8	.....	58	380	350	59	107
3	101	75	10	7.2	.....	44	380	380	60	89
4	101	101	20	7.2	.....	59	220	380	59	89
5	101	101	20	7.2	.....	50	142	295	57	78
6	109	101	20	7.2	.....	38	240	180	56	99
7	109	115	30	6.6	.....	38	280	77	48	118
8	101	106	30	.....	.....	61	420	148	42	128
9	91	106	30	.....	.....	80	390	220	42	128
10	91	125	30	.....	.....	67	420	220	42	118
11	91	125	30	.....	.....	67	340	170	41	128
12	91	125	30	.....	.....	126	190	295	34	118
13	112	115	33	.....	.....	123	137	225	33	128
14	112	115	33	.....	.....	62	137	170	30	122
15	122	125	32	.....	.....	62	137	137	49	131
16	132	125	40	.....	.....	80	285	80	42	131
17	132	125	40	.....	.....	116	240	79	41	131
18	113	125	40	.....	185	134	185	103	29	131
19	123	125	40	.....	210	118	215	130	44	136
20	109	130	40	.....	235	80	215	86	52	141
21	78	130	40	.....	207	15.1	138	115	71	141
22	66	130	40	.....	148	1.6	138	153	81	152
23	101	130	40	.....	141	1.6	218	225	91	152
24	130	120	40	.....	128	66	210	148	11.1	152
25	91	109	40	.....	126	66	175	99	11.1	154
26	111	101	9.4	.....	126	53	124	128	91	135
27	131	110	9.4	.....	109	94	124	94	91	151
28	106	101	8.1	.....	149	198	124	40	91	134
29	106	101	8.1	.....	134	330	230	41	91	124
30	77	101	8.1	.....	109	280	270	69	101	124
31	50	.....	7.8	.....	.....	285	.....	64	101	.....

NOTE.—No record Jan. 8 to Apr. 17.

Monthly discharge of Relief Creek below Relief reservoir, near Baker Station, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	132	50	103	6,330
November	130	75	112	6,660
December	40	7.8	26.4	1,620
January 1–7	7.8	6.6	7.29	101
April 18–30	235	109	154	3,970
May	330	1.6	94.6	5,820
June	420	124	234	13,900
July	380	40	167	10,300
August	101	11.1	56.5	3,470
September	154	78	126	7,500

NOTE.—Monthly discharge computed by engineers of the U. S. Geological Survey.

Digitized by Google

NORTH FORK OF STANISLAUS RIVER NEAR AVERY, CAL.

LOCATION.—In sec. 35, T. 5 N., R. 15 E., 700 feet above intake of Utica Gold Mining Co.'s canal, and about 5 miles northeast of Avery, Calaveras County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 14, 1914 to September 30, 1915.

GAGE.—Vertical staff in two sections on right bank; read once a day by James Hunter.

DISCHARGE MEASUREMENT.—Made from car and cable 35 feet below gage or by wading.

CHANNEL AND CONTROL.—Large boulders and gravel; appear permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.7 feet at 10 a. m. May 11 (discharge, 5,250 second-feet); minimum stage recorded, 1.0 foot for about 12 days in November and at 11 a. m. September 30 (discharge, 34 second-feet).

DIVERSIONS.—Water is diverted from Beaver Creek into the North Fork about half a mile above the station.

REGULATION.—A small amount of storage is developed on the headwaters of this stream above the station.

ACCURACY.—Results good. Rating curve well defined for medium stages. Estimates of low water are a little uncertain due to regulation.

COOPERATION.—Gage-height furnished by Utica Gold Mining Co.

Discharge measurements of North Fork of Stanislaus River near Avery, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 14	H. J. Tompkins	1.85	89	May 18	Charles Leidl	5.45	1,720
17	do	3.06	345	19	do	5.20	1,460
18	do	2.85	283	20	do	5.18	1,440
May 17	Charles Leidl	6.22	2,340	20	do	5.02	1,330
18	do	5.62	1,830	Aug. 1	H. D. McGlashan	1.42	61
18	do	5.52	1,760				

Daily discharge, in second-feet, of North Fork of Stanislaus River near Avery, Cal., for the period July 14, 1914, to Sept. 30, 1915.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1914.				1914.				1914.			
1	.....	57	a 57	11	.....	a 57	57	21	119	57	64
2	.....	57	a 57	12	.....	a 57	a 57	22	a 119	a 57	64
3	.....	57	57	13	.....	57	a 57	23	119	57	64
4	.....	57	a 57	14	224	a 57	57	24	a 102	57	57
5	.....	a 57	57	15	168	57	60	25	86	a 57	a 57
6	.....	57	57	16	a 168	a 57	57	26	86	57	57
7	.....	57	a 57	17	168	57	57	27	78	a 57	a 57
8	.....	57	57	18	a 158	57	a 60	28	71	57	57
9	.....	57	a 57	19	149	a 57	64	29	64	57	a 54
10	.....	57	57	20	a 134	57	a 64	30	a 60	a 57	51
								31	57	57	.....

a Interpolated.

Digitized by Google

Daily discharge, in second-feet, of North Fork of Stanislaus River near Avery, Cal., for the period July 14, 1914, 1914, to Sept. 30, 1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914-15.												
1	51	64	a 54	a 57	b 260	168	a 820	770	2,760	545	57	64
2	51	64	57	57	b 300	a 168	820	a 795	2,870	720	57	a 64
3	51	a 64	a 57	57	b 260	168	a 820	820	2,560	585	64	64
4	a 51	64	57	a 57	b 220	a 163	820	b 800	1,960	a 546	64	a 60
5	51	a 64	57	57	b 180	158	a 848	930	b 1,900	507	60	57
6	a 51	64	57	a 57	b 140	158	875	875	2,350	a 469	60	a 60
7	51	a 60	57	57	96	a 158	820	a 1,030	2,560	431	64	64
8	a 54	57	57	57	a 95	158	a 875	1,180	2,350	328	a 64	a 64
9	57	a 46	a 57	a 57	a 94	a 158	930	1,400	2,350	a 304	64	64
10	a 54	34	57	57	a 93	158	a 1,120	a 3,320	1,880	280	a 64	a 64
11	b 51	34	a 51	a 57	a 92	a 168	1,320	5,250	2,660	a 266	64	64
12	b 51	a 34	45	57	b 91	178	a 1,430	a 4,060	1,320	251	a 64	a 64
13	51	34	a 45	a 57	b 91	a 223	1,540	2,870	1,120	a 214	64	64
14	a 51	34	45	57	91	a 268	1,470	a 2,380	1,700	178	a 62	a 64
15	51	a 34	a 51	a 57	b 95	312	b 1,400	1,880	1,180	133	60	64
16	a 51	34	57	57	133	a 390	1,400	2,560	1,250	a 126	a 60	a 60
17	51	34	a 57	b 78	361	469	1,470	2,870	a 1,150	119	60	57
18	64	a 34	57	a 74	280	a 507	a 1,760	1,700	1,050	a 113	a 60	a 57
19	64	34	b 54	71	b 240	545	2,060	1,320	b 1,050	107	60	57
20	64	34	57	a 68	237	a 610	1,960	1,320	990	96	64	57
21	64	34	b 54	64	a 198	675	1,880	1,250	a 960	a 91	a 64	a 57
22	64	45	57	a 64	158	a 775	1,700	a 1,480	930	86	64	57
23	a 60	a 45	a 57	64	a 136	875	b 1,650	1,700	b 960	a 82	a 64	a 57
24	57	45	57	a 64	113	902	1,320	2,350	585	78	64	57
25	a 54	a 45	a 57	64	b 130	930	a 1,250	a 2,400	a 565	a 74	a 64	a 57
26	51	45	57	b 58	141	a 780	1,180	2,450	545	71	64	57
27	51	a 48	a 57	71	a 141	630	b 1,170	2,660	b 550	a 68	a 64	57
28	a 51	51	57	a 78	141	b 1,000	1,250	2,760	507	64	64	a 54
29	51	a 51	a 57	86	.....	820	1,470	2,350	469	a 60	a 64	51
30	64	51	57	96	.....	a 820	a 1,120	b 2,100	545	57	64	45
31	64	.....	a 57	b 86	.....	820	.....	2,350	.....	57	a 64	.....

a No record; discharge interpolated.
b No record; discharge estimated by comparison with Middle Fork of Stanislaus River near Avery.

NOTE.—Discharge determined from a rating curve well defined between 55 and 4,000 second-feet. Discharge July 14 to Sept. 30, 1914, supersedes that published in Water-Supply Paper 391, p. 184.

Monthly discharge of North Fork of Stanislaus River near Avery, Cal., for the period July 14, 1914, to Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1914.					
July 14-31	224	57	118	4,210	B.
August	57	57	57.0	3,500	B.
September	64	51	58.1	3,460	B.
The period	.....	.....	.....	11,200	
1914-15.					
October	64	51	54.9	3,380	B.
November	64	34	46.0	2,740	C.
December	57	45	55.2	3,390	B.
January	96	57	64.5	3,970	B.
February	361	91	165	9,160	C.
March	1,000	158	462	28,400	B.
April	2,060	820	1,280	76,200	B.
May	5,250	770	2,000	123,000	C.
June	2,870	469	1,450	86,300	B.
July	720	57	229	14,100	B.
August	64	57	62.6	3,850	B.
September	64	45	59.4	3,530	B.
The year	5,250	34	495	358,000	

NOTE.—Monthly-discharge table July to Sept., 1914, supersedes that published in Water-Supply Paper 391, p. 185.

Digitized by Google

UTICA GOLD MINING CO.'S CANAL NEAR AVERY, CAL.

LOCATION.—In sec. 35, T. 5 N., R. 15 E., about 450 feet below head works on North Fork Stanislaus River, and about 5 miles northeast of Avery, Calaveras County.

RECORDS AVAILABLE.—July 14, 1914, to September 30, 1915.

GAGE.—Enameled vertical staff gage, installed May 19, 1915, on right side of flume; read once a day by James Hunter. Previous to May 19, 1915, gage was located 300 feet upstream and on the right bank. It was too near the headgate and could not be properly rated.

DISCHARGE MEASUREMENTS.—Made from foot plank across flume at gage.

CHANNEL AND CONTROL.—Rectangular wooden flume.

EXTREMES OF DISCHARGE.—Maximum stage recorded May 19 to September 30, 1.65 feet May 19, 1915 (discharge, 116 second-feet); minimum stage recorded, 0.55 foot May 19 (discharge, 24 second-feet).

WINTER FLOW.—Stage-discharge relation may be affected by ice.

ACCURACY.—Record does not agree with record on North Fork of Stanislaus River, just above intake, when canal is taking all the water. This may be due to the following: Gage heights not read to sufficient degree of refinement; high velocities in canal introduce uncertainties; discharge measurements subject to considerable error because of shallow depths. No estimates of discharge were prepared for the old gage read till May 18, 1915, because it could not be properly rated.

COOPERATION.—Gage-height record furnished by Utica Gold Mining Co.

Discharge measurements of Utica Gold Mining Co.'s canal near Avery, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.[a]	Gage height.[b]	Discharge.
		Feet.	*Feet.*	*Sec.-ft.*
Feb. 14	H. J Tompkins	1.20	.....	72
May 19	Charles Leidl	.45	0.55	24
19	.....do	.70	.92	50
19	.....do	1.25	1.38	88
19	.....do	1.80	1.65	120
19	.....do	.....	1.65	113
Aug. 1	H. D. McGlashan	1.00	1.03	60

[a] Old gage. [b] New gage installed May 19, 1915.

Digitized by Google

Daily gage height,[a] in feet, of Utica Gold Mining Co.'s canal near Avery, Cal., for the period Oct. 1, 1914, to May 18, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.
1	1.1	1.3	.....	.....	.....	1.3	.....	1.3
2	1.1	1.3	1.1	1.1	.....	.....	1.3	.....
3	1.1	.....	.....	1.1	.....	1.3	.....	1.3
4	.....	1.3	1.1	.....	.....	.....	1.3	.....
5	1.1	.....	1.1	1.1	.....	1.3	.....	1.3
6	.....	1.3	1.1	.....	.....	1.3	1.3	1.3
7	1.1	.....	1.1	1.1	1.3	.....	1.3	.....
8	.....	1.2	1.1	1.1	.....	1.3	.....	1.3
9	1.1	.....	.....	.....	.....	.....	1.3	1.3
10	.....	.8	1.1	1.1	.....	1.3	.....	.....
11	.....	.8	.....	.....	.....	.....	1.3	1.3
12	.....	.....	1.0	1.1	.....	1.3	.....	.....
13	1.1	.8	.....	.....	.....	.....	1.3	1.3
14	.....	.8	.9	1.3	1.2	.....	1.3	.....
15	1.1	.....	.....	.....	.....	1.3	.....	1.3
16	.....	.8	1.1	1.1	1.3	.....	1.3	1.3
17	1.1	.8	.....	.....	1.3	1.3	1.3	1.3
18	1.3	.....	1.1	.....	1.3	.....	.....	1.3
19	1.3	.8	.....	1.2	.....	1.3	1.3	.....
20	1.3	.8	1.1	.....	1.3	.....	1.3	.....
21	1.3	.8	.....	1.2	.....	1.3	1.3	.....
22	1.3	.9	1.1	.....	1.3	.....	1.3	.....
23	.....	.....	.....	1.2	.....	1.3	.....	.....
24	1.2	.9	1.1	.....	1.3	.....	1.3	.....
25	.....	.....	.....	1.2	.....	1.3	.....	.....
26	1.1	.9	1.1	.....	1.3	.....	1.3	.....
27	1.1	.....	.....	1.3	.....	1.3	.....	.....
28	.....	1.0	1.1	.....	1.3	.....	1.3	.....
29	1.1	.....	.....	1.3	.....	1.3	1.3	.....
30	1.3	1.0	1.1	1.3	.....	.....	.....	.....
31	1.3	.....	.....	.....	.....	1.3	.....	.....

[a] From old gage read previous to May 19. See remarks under "Accuracy" in station description.

Daily discharge, in second-feet, of Utica Gold Mining Co.'s canal near Avery, Cal., for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	88	78	57	74	16	.....	88	a 78	a 70	a 70
2	.....	88	78	57	a 74	17	.....	a 88	78	70	70
3	.....	88	78	57	74	18	.....	88	a 78	a 70	a 70
4	.....	88	a 78	57	a 72	19	88	a 88	78	70	70
5	.....	a 88	78	57	70	20	88	88	78	70	70
6	.....	88	a 78	57	a 70	21	88	a 88	a 78	a 71	a 70
7	.....	88	78	67	70	22	a 88	88	78	72	70
8	.....	88	78	a 67	a 70	23	88	a 88	a 78	a 73	a 70
9	.....	88	a 78	67	70	24	88	88	78	74	70
10	.....	88	78	a 67	a 70	25	a 88	a 88	a 78	a 74	a 64
11	.....	88	a 78	67	70	26	88	88	78	74	57
12	.....	88	78	a 68	a 70	27	88	a 83	a 78	a 74	57
13	.....	88	a 78	70	70	28	88	78	78	74	a 53
14	.....	88	78	a 70	a 70	29	88	78	a 78	a 73	49
15	.....	88	a 78	70	70	30	a 88	78	78	72	49
						31	88	.....	78	72	.....

a Interpolated.

NOTE.—Discharge determined from a well-defined rating curve.

Digitized by Google

Monthly discharge of Utica Gold Mining Co.'s canal near Avery, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May 19–31	88	88	88.0	2,270	B.
June	88	78	86.8	5,160	B.
July	78	78	78.0	4,800	B.
August	74	57	68.0	4,180	B.
September	74	49	67.4	4,010	B.
The period				20,400	

SOUTH FORK OF STANISLAUS RIVER AT STRAWBERRY,[1] CAL.

LOCATION.—In the SE. ¼ sec. 17, T. 4 N., R. 18 E., at site of former Sonora-Bridgeport State highway bridge at Strawberry, Tuolumne County, a summer resort in Stanislaus National Forest, 1½ miles below mouth of Herring Creek, and 15 miles northeast of Confidence.

DRAINAGE AREA.—About 54 square miles.

RECORDS AVAILABLE.—October 20, 1911, to September 30, 1915.

GAGE.—Vertical staff on left bank fastened to abutment of former bridge about 30 feet upstream from suspension footbridge. Gage read twice a day by an employee of the Sierra & San Francisco Power Co. Original gage, located at same place, was torn out when bridge was removed, August 31, 1914. A temporary gage was used till October 10 and the old gage reinstalled October 14. Original datum has probably not been maintained.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; appear permanent. Left bank is about 20 feet high; right bank is lower, but probably is not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.4 feet at 4 p. m. June 8 (discharge, 1,450 second-feet); minimum stage recorded, 0.70 foot November 26 to December 6 (discharge, 5.0 second-feet).

1911–1915: Maximum stage recorded, 5.4 feet at 4 p. m. June 8, 1915 (discharge, 1,450 second-feet); minimum stage recorded, 1.15 feet November 2 and 3, 1912 (discharge, 3 second-feet).

WINTER FLOW.—Stage-discharge relation probably slightly affected by ice.

DIVERSIONS.—None above.

REGULATION.—The flow is partially regulated by three reservoirs which have been constructed above the station to supply Tuolumne and Sonora with water for domestic use. This water is diverted about 10 miles below the station.

ACCURACY.—Results good.

COOPERATION.—Gage-height record furnished by Sierra & San Francisco Power Co., through H. F. Jackson, general manager.

Discharge measurements of South Fork of Stanislaus River at Strawberry, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
July 22	Oakdale irrigation district	1.8	79	Aug. 6	Oakdale irrigation district	1.4	38
23	H. D. McGlashan	1.45	29	8	Sierra & San Francisco Power Co	1.4	35
30	Oakdale irrigation district	1.5	41	Sept. 17	....do	.90	9.1

[1] Formerly published as "near Confidence."

Digitized by Google

Daily discharge, in second-feet, of South Fork of Stanislaus River at Strawberry, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	27	26	5.0	48	109	48	109	215	1,230	530	28	48
2	19	24	5.0	61	91	68	118	127	1,120	530	28	46
3	18	24	5.0	75	91	48	146	127	965	530	28	39
4	16	24	5.0	83	83	48	190	127	865	512	28	38
5	16	24	5.0	75	100	48	190	146	915	442	28	37
6	14	24	5.0	75	48	48	190	156	1,020	265	28	35
7	12	24	5.5	75	48	48	167	190	1,230	265	28	23
8	8.8	22	6.0	75	54	48	167	240	1,450	265	28	7.2
9	8.8	20	8.0	109	61	61	167	252	1,230	295	24	7.1
10	8.8	20	8.0	109	75	61	178	325	1,120	295	24	6.6
11	8.3	28	8.0	91	75	48	228	460	1,020	295	24	6.4
12	7.8	58	14	91	75	48	280	530	820	265	24	6.4
13	7.3	48	20	91	91	48	325	512	650	265	22	6.5
14	6.8	46	20	109	83	75	215	408	650	265	20	6.5
15	5.5	42	20	75	48	83	240	340	730	240	20	7.1
16	5.5	35	28	48	61	91	295	460	820	240	22	5.5
17	5.5	17	37	37	75	109	408	570	730	215	42	5.5
18	7.2	9.0	37	42	75	127	495	460	820	190	49	6.2
19	48	5.5	37	48	61	146	570	390	775	127	48	6.0
20	75	5.5	37	61	61	178	610	310	730	102	48	6.0
21	37	5.5	37	75	61	190	570	228	730	78	42	6.0
22	20	5.5	37	48	61	202	512	265	730	53	42	6.0
23	17	5.5	37	42	61	215	390	372	730	28	42	6.0
24	14	5.5	61	48	48	215	310	390	730	28	40	5.9
25	14	5.5	48	48	48	252	240	355	650	28	40	5.9
26	12	5.0	48	37	48	215	240	390	570	28	49	5.7
27	10	5.0	42	54	48	190	252	730	530	28	51	5.6
28	9.6	5.0	37	109	48	190	355	775	570	28	51	5.5
29	8.0	5.0	42	127	.....	190	325	820	570	28	51	5.5
30	20	5.0	48	109	.....	190	295	1,020	570	28	51	5.5
31	22	.....	48	91	.....	167	.....	1,120	.....	28	51	.....

NOTE.—Discharge determined from a rating curve fairly well defined below 900 second-feet. Discharge Oct. 1–10 estimated from stage record from temporary gage, and an estimate of discharge of 32 second-feet for a stage of 1.8 feet, made by Sierra & San Francisco Power Co. Discharge Oct. 11–13 and July 20–22 interpolated.

Monthly discharge of South Fork of Stanislaus River at Strawberry, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	75	5.5	16.4	1,010	D.
November	58	5.0	19.3	1,150	C.
December	61	5.0	25.8	1,590	C.
January	127	37	73.1	4,490	B.
February	109	48	67.4	3,740	B.
March	252	48	119	7,320	B.
April	610	109	293	17,400	B.
May	1,120	127	413	25,400	B.
June	1,450	530	842	50,100	B.
July	530	28	210	12,900	B.
August	51	20	35.5	2,180	C.
September	48	5.5	13.6	809	C.
The year	1,450	5.0	177	128,000	

SOUTH SAN JOAQUIN CANAL[1] NEAR KNIGHTS FERRY, CAL.

LOCATION.—At footbridge three-fourths mile below headgate at Goodwin dam on Stanislaus River, 4 miles above Knights Ferry, Stanislaus County.

RECORDS AVAILABLE.—May 1, 1914, to September 30, 1915. Also miscellaneous measurements and roughly approximate estimates for 1913.

[1] Also known as Main Supply canal.

Digitized by Google

GAGE.—Inclined staff on right bank fastened to the concrete lining, read until February 28, 1915. A vertical staff installed in a gage well on left bank was used after March 12, 1915. This gage is 100 feet above the old gage and probably at the same datum. Gage read twice a day by Griffin Morrison.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Canal has trapezoidal section and is concrete lined.

EXTREMES OF DISCHARGE.—1914–15: Maximum stage recorded, 8.2 feet June 23, 1915 (discharge, 871 second-feet); no flow several periods each year.

ACCURACY.—Results excellent. Rating curves well defined.

COOPERATION.—Daily gage-height record furnished by South San Joaquin irrigation district through A. Griffin, chief engineer.

The water is used for irrigation in the Oakdale and South San Joaquin districts. South San Joaquin canal is on the right bank of the river.

Discharge measurements of South San Joaquin canal near Knights Ferry, Cal., during the year ending Sept. 30, 1915.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 23	5.25	490	May 23	3.81	318	May 23	2.20	128
23	6.24	616	23	1.00	36	23	3.16	237

Daily discharge, in second-feet, of South San Joaquin canal near Knights Ferry, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	162	.....	9	.....	.....	.....	243	507	559	793	327	195
2	162	.....	9	.....	.....	.....	291	533	598	793	303	207
3	162	.....	9	.....	.....	.....	291	585	624	396	303	207
4	162	.....	9	.....	.....	.....	291	611	624	110	303	207
5	162	.....	9	223	.....	.....	291	611	611	585	315	207
6	162	.....	9	223	.....	.....	291	611	611	741	291	195
7	162	.....	9	223	.....	.....	291	611	611	741	291	195
8	162	.....	9	223	.....	.....	291	611	598	741	291	195
9	162	.....	9	223	.....	.....	291	611	806	741	241	207
10	162	.....	8	223	.....	.....	291	624	806	741	219	195
11	162	.....	65	223	.....	.....	291	559	819	741	231	195
12	162	.....	.....	223	.....	128	303	483	793	741	231	219
13	162	.....	.....	223	.....	183	303	495	806	741	231	195
14	162	.....	.....	223	.....	183	291	483	806	741	219	207
15	162	.....	.....	223	.....	195	291	483	806	741	219	207
16	192	.....	.....	.....	.....	195	291	483	819	741	303	351
17	236	14	.....	.....	.....	195	291	495	832	741	183	219
18	258	14	.....	.....	.....	195	291	495	832	741	195	219
19	258	14	.....	.....	.....	195	363	483	832	728	195	219
20	269	14	.....	.....	.....	219	471	483	832	728	219	207
21	280	14	.....	.....	.....	243	483	483	832	728	219	207
22	349	14	.....	.....	.....	114	483	483	819	715	207	219
23	269	14	.....	.....	.....	114	483	483	871	741	195	207
24	247	9	.....	.....	.....	231	471	495	819	741	195	207
25	247	5	.....	.....	.....	160	411	483	793	728	195	207
26	247	5	.....	.....	.....	96	128	447	793	611	207	219
27	247	5	.....	.....	.....	183	219	507	793	520	195	207
28	247	5	.....	54	134	195	363	483	793	435	195	207
29	144	9	.....	284	.....	195	447	483	793	411	207	207
30	.....	9	.....	.....	.....	183	459	546	793	339	195	207
31	.....	.....	.....	.....	.....	183	.....	559	.....	327	195	.....

NOTE.—Discharge determined from three well-defined rating curves applicable Oct. 1–29, Nov. 17 to Feb. 28, and Mar. 12 to Sept. 30. Canal dry Oct. 30 to Nov. 16, Dec. 12 to Jan. 4, Jan. 16–27, Jan. 30 to Feb. 27 and Mar. 1–11.

Digitized by Google

Monthly discharge of South San Joaquin canal near Knights Ferry, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	349	0	191	11,700	A.
November	14	0	4.8	286	B.
December	65	0	5.0	307	B.
January	284	0	90.0	5,530	B.
February	134	0	4.8	267	.....
March	243	0	116	7,130	A.
April	483	128	333	19,800	A.
May	624	447	526	32,300	A.
June	871	559	757	45,000	A.
July	793	110	647	39,800	A.
August	327	183	236	14,500	A.
September	351	195	211	12,600	A.
The year	871	0	262	189,000	

OAKDALE CANAL[1] NEAR KNIGHTS FERRY, CAL.

LOCATION.—At footbridge 800 feet below headgate at Goodwin Dam on Stanislaus measurements and roughly approximate estimates for 1913.

RECORDS AVAILABLE.—May 3, 1914, to September 30, 1915. Also miscellaneous measurements and roughly approximate estimates for 1913.

GAGE.—Vertical staff in stilling well on left bank installed May 23, 1915; before that date the gage was a vertical staff [2] on left side of canal at same site and datum; read twice a day by E. C. Pearson.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Canal has trapezoidal section and side walls are concrete.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and period 1914–15: 3.65 feet at 7 a. m. July 28, 1915 (discharge, 181 second-feet); no flow during periods of each year.

ACCURACY.—Results good.

COOPERATION.—Daily gage-height record furnished by Oakdale irrigation district through Burton Smith, chief engineer.

The water is used for irrigation in the Oakdale district. Oakdale canal is on the left bank of the river.

Discharge measurements of Oakdale canal near Knights Ferry, Cal., during the year ending Sept. 30, 1915.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 23	2.35	109	June 9	0.83	23	Aug. 27	1.28	41
23	3.41	163	9	1.00	31	27	.51	3.7
23	.80	17.2	Aug. 27	1.62	63	27	.88	17.1
23	1.46	62	27	1.25	39			

[1] Also known as South Main canal.

[2] Description of gage in Water-Supply Paper 391, p. 188, is in error. Records May 3 to Sept. 30, 1914, refer to the vertical staff gage.

Digitized by Google

Daily discharge, in second-feet, of Oakdale canal near Knights Ferry, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Dec	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	64	.....	31	.....	0.0	0.0	0.0	170	140	71
2	66	.....	31	.....	90	.0	.0	170	123	74
3	66	.....	31	.....	90	31	120	170	129	77
4	61	.....	31	.....	92	87	153	170	117	74
5	58	.....	15.6	.....	90	87	153	170	112	77
6	61	.....	.....	.....	90	90	153	164	106	71
7	61	.....	.....	.....	76	106	65	170	103	65
8	66	.....	.....	.....	65	103	153	170	100	71
9	66	.....	.....	.....	65	103	.0	170	71	71
10	64	.....	.....	.....	65	106	153	170	88	65
11	66	.....	.....	.....	65	103	153	170	88	71
12	61	.....	.....	.....	65	98	153	170	88	82
13	61	.....	.....	.....	65	103	170	.0	85	71
14	64	.....	.....	.....	65	101	170	.0	82	82
15	61	.....	.....	.....	65	101	170	.0	74	80
16	.....	.....	.....	.....	65	103	170	.0	65	77
17	.....	.....	.....	.....	87	103	170	.0	68	77
18	.....	.....	.....	.....	90	103	170	.0	77	77
19	.....	.....	.....	31	90	101	170	.0	77	85
20	.....	.....	.....	87	90	101	170	7.5	82	77
21	.....	.....	.....	87	87	103	170	13.2	74	71
22	.....	.....	.....	90	87	103	170	16.0	71	71
23	.....	.....	.....	87	87	103	170	85	71	71
24	.....	.....	.....	87	87	103	170	164	74	71
25	.....	15.6	.....	87	87	106	170	164	65	74
26	.....	28	.....	87	87	120	170	146	71	77
27	.....	31	.....	87	87	131	170	135	65	68
28	.....	31	.....	87	87	131	170	175	77	71
29	.....	31	.....	87	.0	131	170	158	77	77
30	.....	31	.....	.0	.0	131	170	135	65	77
31	.....	31	.....	.0	.....	131	.....	140	71	.....

NOTE.—Discharge determined from three rating curves as follows: Oct. 1–15, well defined; Dec. 25 to July 12, fairly well defined; and July 20 to Sept. 30, well defined between 3 and 70 second-feet. Canal dry Oct. 16 to Dec. 24 and Jan. 6 to Mar. 18.

Monthly discharge of Oakdale canal near Knights Ferry, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	66	0.0	30.5	1,880	A.
November	0	.0	.00	0	
December	31	.0	6.41	394	C.
January	31	.0	4.50	277	C.
February	0	.0	.00	0	
March	90	.0	29.2	1,800	B.
April	92	.0	72.2	4,300	B.
May	131	.0	97.5	6,000	B.
June	170	.0	144	8,570	B.
July	175	.0	109	6,700	A.
August	140	65	85.7	5,270	A.
September	85	65	74.1	4,410	A.
The year	175	.0	54.6	39,600	

Digitized by Google

CALAVERAS RIVER AT JENNY LIND, CAL.

LOCATION.—In the SE. ¼ sec. 22, T. 3 N., R. 10 E., at highway bridge on Milton road about one-fourth mile southeast of Jenny Lind, Calaveras County, and 27 miles above junction with San Joaquin River. North and South forks unite about 15 miles above station.

DRAINAGE AREA.—395 square miles.

RECORDS AVAILABLE.—January 1 to June 30, 1907; December 1, 1907 to June 30, 1908; and November 1, 1908, to September 30, 1915.

GAGE.—Vertical staff in two sections; high-water section is on downstream end of middle pier of bridge; low-water section is underneath bridge on right bank. Gage read once a day by P. F. Sinclair.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Composed of gravel and small boulders; shifts during high water. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.4 feet at 4 p. m. February 2 (discharge, 9,190 second-feet); no flow October 1 to 12 and August 5 to September 9.

1907–1915: Maximum stage recorded, 14 feet January 31, 1911 (discharge, 69,600 second-feet); no flow July 22 to November 17, 1913; October 1 to 12, 1914, and August 5 to September 9, 1915.

DIVERSIONS.—None.

REGULATION.—A small amount of storage is developed at Salt Springs Valley for use in connection with dredging operations below Jenny Lind.

ACCURACY.—Results only fair on account of changes in the control and uncertainties, at times, in the gage height record.

COOPERATION.—Gage-height record during the high-water season, December to June, is furnished by the United States Weather Bureau through N. R. Taylor, local forecaster.

Discharge measurements of Calaveras River at Jenny Lind, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 3	R. C. Rice	2.91	4,430	Feb. 12	R. C. Rice	1.88	1,530
9	.....do	3.13	5,040	Apr. 18	Charles Leidl	.10	170
10	.....do	2.89	4,450	June 7	H. J. Tompkins	—.51	88
10	.....do	4.22	9,110	7	.....do	—.51	84
10	.....do	4.33	8,280	July 9	.....do	—.85	28
11	.....do	2.84	3,130				

Digitized by Google

Daily discharge, in second-feet, of Calaveras River at Jenny Lind, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	200	340	240	8,420	580	335	140	200	20	5.9	.....
2	.....	200	340	240	7,370	580	335	140	166	20	5.9	.....
3	.....	200	680	340	5,820	510	285	140	136	20	5.9	.....
4	.....	200	680	600	2,610	510	285	140	110	20	5.9	.....
5	.....	200	600	400	1,140	510	285	140	88	20	.....	.....
6	.....	200	600	400	1,140	450	240	140	70	20	.....	.....
7	.....	240	530	400	1,040	450	240	140	70	20	.....	.....
8	.....	240	460	530	1,040	450	240	140	70	5.9	.....	.....
9	.....	290	340	940	7,370	390	200	140	70	5.9	.....	.....
10	.....	290	340	600	6,110	390	200	140	70	5.9	.....	6
11	.....	290	460	600	3,260	390	200	140	52	5.9	.....	6
12	.....	340	460	600	1,900	335	200	140	52	5.9	.....	6
13	290	340	340	460	1,000	335	200	140	52	5.9	.....	6
14	290	340	340	460	730	335	170	140	52	5.9	.....	6
15	290	340	340	460	580	285	170	140	52	5.9	.....	6
16	290	340	340	460	510	285	170	140	52	5.9	.....	6
17	240	340	340	340	510	285	170	140	52	5.9	.....	6
18	240	340	340	340	1,820	285	140	586	52	5.9	.....	6
19	240	340	340	340	1,210	285	140	442	52	5.9	.....	6
20	240	340	340	290	900	285	140	238	52	5.9	.....	6
21	240	340	340	290	1,430	240	140	238	52	5.9	.....	6
22	200	340	240	240	1,430	240	140	238	36	5.9	.....	6
23	200	340	240	240	1,320	240	140	238	36	5.9	.....	6
24	200	340	240	240	1,100	240	140	238	36	5.9	.....	6
25	200	340	240	200	900	240	140	238	36	5.9	.....	6
26	200	340	240	200	730	240	140	238	36	5.9	.....	6
27	200	340	240	200	580	240	140	238	20	5.9	.....	6
28	200	340	240	4,700	580	390	140	238	20	5.9	.....	6
29	200	340	240	2,450	.....	390	140	238	20	5.9	.....	6
30	200	340	240	1,720	.....	335	140	238	20	5.9	.....	6
31	200	.....	240	2,150	.....	335	.....	238	.....	5.9	.....	.....

NOTE.—Discharge determined from four rating curves as follows: Oct. 1 to Jan. 27, fairly well defined below 7,000 second-feet; Jan. 28 to Feb. 10, well defined between 3,500 and 6,000 second-feet; Feb. 11 to May 17, fairly well defined; and May 18 to Sept. 30, fairly well defined below 150 second-feet. No flow Oct. 1–12 and Aug. 5 to Sept. 9. Discharge, Sept. 10–30, estimated.

Monthly discharge of Calaveras River at Jenny Lind, Cal., for the year ending Sept 30, 1915.

[Drainage area, 395 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	290	0.0	141	0.357	0.41	8,670	B.
November	340	200	300	.759	.85	17,900	B.
December	680	240	364	.922	1.06	22,400	B.
January	4,700	200	699	1.77	2.04	43,000	B.
February	8,420	510	2,230	5.65	5.88	124,000	B.
March	580	240	357	.904	1.04	22,000	B.
April	335	140	192	.486	.54	11,400	B.
May	586	140	202	.511	.59	12,400	C.
June	200	20	62.7	.159	.18	3,730	C.
July	20	5.9	9.08	.023	.03	558	C.
August	5.9	.0	.76	.0019	.002	47	D.
September	6	.0	4.20	.011	.01	250	
The year	8,420	.0	368	.932	12.63	266,000	

Digitized by Google

MOKELUMNE RIVER NEAR CLEMENTS, CAL.

LOCATION.—In the NW. ¼ sec. 15, T. 4 N., R. 8 E., at highway bridge about 1 mile north of Clements, San Joaquin County. Cosumnes River enters about 19½ miles below the station. The North and Middle forks of the Mokelumne unite about 35 miles above Clements.

DRAINAGE AREA.—642 square miles.

RECORDS AVAILABLE.—October 28, 1904, to September 30, 1915.

GAGE.—Staff in four sections at bridge; No. 1 is vertical and fastened to pile on right bank; No. 2 is inclined, directly back of No. 1; No. 3 is vertical and bolted to middle pier near downstream end; No. 4 is vertical and bolted to left abutment near downstream end. Gage read twice a day by Mrs. J. S. Hodges.

DISCHARGE MEASUREMENTS.—Made from bridge at gage, or by wading.

CHANNEL AND CONTROL.—Sand and gravel; somewhat shifting. Right bank high and not subject to overflow. Left bank is overflowed above stage 15 feet for a distance of 200 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.3 feet at 6 a. m. June 8 and 6.30 a. m. June 9 (discharge, 8,290 second-feet); minimum stage recorded, 2.8 feet at 6.30 a. m. August 30 (discharge, 55 second-feet).

1904–1915: Maximum stage recorded, 17.45 feet January 30, 1911 (discharge, 16,700 second-feet); minimum stage recorded, 2.5 feet, October 3 to 5, 1912 (discharge, 23 second-feet).

DIVERSIONS.—Several small ditches divert water for mining and irrigation above the station. Power is developed on the North Fork and part of the water is diverted outside of the drainage basin.

REGULATION.—Flow is partly regulated by storage developed on the headwaters of the North Fork.

ACCURACY.—Results good. Rating curves fairly well defined.

Discharge measurements of Mokelumne River near Clements, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 26	R. C. Rice	3.16	109	July 8	H. J. Tompkins	5.14	978
Feb. 4	do	5.79	1,290				

Digitized by Google

Daily discharge, in second-feet, of Mokelumne River near Clements, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	125	205	145	145	2,280	1,020	1,260	1,810	7,750	1,800	157	94
2	125	145	145	115	2,980	860	1,400	1,520	6,180	1,800	143	83
3	125	235	235	135	2,040	805	1,660	1,400	4,950	1,720	172	83
4	125	205	282	335	1,200	750	1,810	1,260	3,860	1,520	129	94
5	100	180	282	205	915	700	1,660	1,400	4,390	1,380	116	94
6	125	168	282	265	778	700	1,520	1,400	5,430	1,250	116	94
7	125	168	205	220	700	625	1,400	1,520	6,310	1,010	104	94
8	125	145	220	355	725	625	1,520	1,810	6,700	1,010	94	94
9	125	155	205	375	3,540	650	1,460	1,960	6,440	1,010	68	94
10	135	135	265	220	2,620	650	1,520	3,840	5,790	1,010	76	94
11	125	135	282	220	1,520	625	1,810	4,400	5,070	900	83	94
12	100	135	282	205	1,140	600	2,120	5,100	3,660	872	83	94
13	115	125	168	168	915	625	2,530	6,630	3,000	790	68	94
14	115	125	145	575	778	625	2,120	4,170	3,180	713	76	83
15	115	125	145	550	700	750	1,880	3,540	3,860	664	83	83
16	115	100	125	300	700	860	1,960	4,620	4,060	548	76	116
17	135	115	300	220	1,140	1,020	2,890	5,220	3,460	439	83	116
18	115	115	220	155	1,880	1,140	3,540	4,620	3,460	439	94	116
19	115	115	155	168	1,460	1,080	3,840	3,740	3,270	376	94	116
20	145	115	600	168	1,400	1,020	4,060	3,160	2,750	356	83	83
21	168	115	168	155	1,330	1,080	3,340	2,890	2,660	336	83	116
22	220	115	145	155	1,200	1,020	3,160	2,800	3,000	277	76	116
23	168	100	145	145	1,080	1,260	2,890	2,980	3,090	296	68	116
24	155	115	155	145	1,020	1,400	2,360	3,540	2,420	222	83	129
25	145	125	180	125	915	1,460	2,120	3,160	2,260	188	83	143
26	115	100	125	145	915	1,400	1,960	2,980	1,940	258	83	129
27	115	92	168	220	750	1,260	1,810	4,620	1,800	240	83	129
28	125	100	135	1,080	1,200	1,400	2,620	6,350	1,800	222	83	157
29	135	115	155	915	.....	2,120	2,530	6,090	1,940	188	76	143
30	180	108	145	860	.....	1,520	2,440	5,340	1,940	172	68	129
31	145	.....	145	805	.....	1,330	.....	6,090	.....	157	94	.....

NOTE.—Discharge determined from two rating curves as follows: Oct. 1 to June 1, fairly well defined, and June 2 to Sept. 30, fairly well defined below 1,500 second-feet.

Monthly discharge of Mokelumne River near Clements, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	220	100	132	8,120	B.
November	235	92	134	7,970	B.
December	600	125	205	12,600	B.
January	1,080	115	318	19,600	B.
February	3,540	700	1,350	75,000	B.
March	2,120	600	999	61,400	B.
April	4,060	1,260	2,240	133,000	B.
May	6,630	1,260	3,550	218,000	B.
June	7,750	1,800	3,880	231,000	B.
July	1,800	157	715	44,000	B.
August	172	68	92.8	5,710	B.
September	157	83	107	6,370	B.
The year	7,750	68	1,140	823,000	

MIDDLE FORK OF MOKELUMNE RIVER AT WESTPOINT, CAL.

LOCATION.—In sec. 10, T. 6 N., R. 13 E., above highway bridge 1 mile south of Westpoint, Calaveras County, 1¼ miles below mouth of Bear Creek and 3½ miles above juntion with the South Fork.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 9, 1911, to September 30, 1915.

Digitized by Google

GAGE.—Vertical staff in two sections, fastened to trees on right bank, 1,000 feet above bridge; read once a day by C. H. Spink.

DISCHARGE MEASUREMENTS.—Made from car and cable half a mile above gage or by wading.

CHANNEL AND CONTROL.—Boulders and gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.6 feet during night of May 13 (discharge, 701 second-feet); minimum stage recorded, 2.74 feet at 5.45 p. m. September 9 (discharge, 5.0 second-feet).

1911–1915: Maximum stage recorded, 10.0 feet at 4 p. m. January 23, 1914 (discharge, 2,550 second-feet); minimum stage recorded, 2.48 feet at 1 p. m. August 15, 1913 (discharge, 2.8 second-feet).

WINTER FLOW.—Stage-discharge relation may be slightly affected by ice.

DIVERSIONS.—Mokelumne Hill and Valley Springs ditch (capacity about 6 second-feet) diverts water about 2 miles above the station.

REGULATION.—None.

ACCURACY.—Results good.

Discharge measurements of Middle Fork of Mokelumne River at West Point, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 27	R. C. Rice	2.83	6.4	June 5	H. J. Tompkins	4.42	133
June 3	H. J. Tompkins	4.52	144				

Daily discharge, in second-feet, of Middle Fork of Mokelumne River at West Point, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5.2	8.0	7.8	7.8	311	128	168	143	188	31	11	6.0
2	5.2	7.8	8.2	7.8	376	114	168	128	151	30	10	6.0
3	5.2	7.4	15	7.8	168	101	176	121	143	29	9.6	6.0
4	5.2	7.4	10	11	128	95	176	136	128	30	9.6	6.0
5	5.2	7.4	18	9.8	89	89	176	136	121	28	10	6.0
6	5.2	7.4	13	13	78	84	168	128	114	27	9.1	5.7
7	5.2	7.4	10	12	64	78	213	128	114	27	8.7	5.4
8	5.2	7.4	9.1	22	276	72	176	128	108	26	8.5	5.4
9	6.0	7.4	8.5	13	276	76	168	223	101	25	8.2	5.0
10	6.0	7.4	13	12	223	76	168	244	95	26	8.0	5.4
11	6.0	7.4	13	10	101	75	176	404	89	24	7.8	5.7
12	6.0	7.4	10	13	101	75	185	376	89	22	7.8	6.0
13	6.0	7.4	10	27	89	74	194	494	75	20	8.2	5.7
14	6.0	7.4	9.6	89	78	78	176	349	69	18	8.2	6.0
15	6.0	7.4	9.6	30	67	89	168	299	65	18	8.2	6.0
16	6.0	7.3	9.6	17	136	95	176	276	61	18	8.2	6.0
17	6.9	7.3	11	15	376	95	185	463	57	17	7.8	6.0
18	6.9	7.1	10	13	276	108	185	376	57	14	7.8	6.0
19	7.8	7.1	8.9	12	194	108	194	336	55	15	7.8	6.0
20	13	6.9	8.5	11	194	114	194	288	52	14	7.8	6.0
21	8.9	6.9	8.0	12	159	114	194	254	50	13	7.8	6.0
22	7.8	6.7	7.8	13	143	121	185	233	48	13	7.8	6.0
23	6.9	6.9	7.8	13	143	136	176	213	44	13	7.4	6.0
24	6.9	6.9	7.8	13	143	136	159	265	41	13	7.1	6.0
25	6.9	6.9	7.6	17	128	136	151	223	38	13	6.7	6.0
26	6.9	6.9	7.8	15	108	143	136	213	36	12	6.4	6.0
27	6.5	6.9	7.8	24	101	136	128	213	34	12	6.0	6.0
28	6.5	8.2	7.8	78	168	376	128	204	33	11	6.0	6.0
29	6.4	8.0	7.8	128	.....	233	176	194	33	11	5.4	6.0
30	7.8	7.8	7.8	78	.....	194	143	185	32	10	5.4	6.0
31	7.3	.....	7.8	136	.....	176	.....	176	.....	10	5.4	.....

NOTE.—Discharge determined from a rating curve well defined below 250 second-feet.

Digitized by Google

Monthly discharge of Middle Fork of Mokelumne River at West Point, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	13	5.2	6.55	403	B.
November	8.2	6.7	7.33	436	A.
December	18	7.6	9.63	592	A.
January	136	7.8	28.4	1,750	A.
February	376	64	168	9,330	B.
March	376	72	120	7,380	A.
April	213	128	172	10,200	A.
May	494	121	244	15,000	B.
June	188	32	77.4	4,610	A.
July	31	10	19.0	1,170	A.
August	11	5.4	7.86	483	A.
September	6.0	5.0	5.88	350	B.
The year	494	5.0	71.4	51,700	

SOUTH FORK OF MOKELUMNE RIVER NEAR RAILROAD FLAT, CAL.

LOCATION.—In sec. 34, T. 6 N., R. 14 E., at Laidet ranch, about 5 miles above mouth of Licking Fork and 5 miles east of Railroad Flat, Calaveras County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 23, 1911, to September 30, 1915.

GAGE.—Vertical staff fastened to alder tree on right bank, 100 feet above suspension footbridge; read twice a day by Florence Laidet.

DISCHARGE MEASUREMENTS.—Made from cable 150 feet below gage or by wading.

CHANNEL AND CONTROL.—Composed of gravel and appear almost permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.51 feet at 7.40 a. m., May 14 (discharge, 660 second-feet); minimum stage recorded, 1.07 feet at 3.10 p. m., October 14 (discharge, 6.4 second-feet).

1911–1915: Maximum stage recorded, 6.9 feet at 4.20 p. m., January 25, 1914 (discharge, 3,330 second-feet); minimum stage recorded, 1.10 feet, November 18, 1911 (discharge, 4 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice this year.

DIVERSIONS.—An irrigation and power ditch (capacity about 2 second-feet) diverts water at base of Blue Mountain, above station. Some water is also used for irrigation at Laidet ranch.

REGULATION.—No information.

ACCURACY.—Results good.

Discharge measurements of South Fork of Mokelumne River near Railroad Flat, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 27	R. C. Rice	1.11	7.6
June 4	H. J. Tompkins	2.08	106

Digitized by Google

Daily discharge, in second-feet, of South Fork of Mokelumne River near Railroad Flat, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6.6	11	9.4	10	175	125	175	150	138	42	18	11
2	7.0	9.7	10	9.4	295	115	175	150	125	42	15	10
3	7.3	9.1	19	10	338	115	190	138	105	42	14	9.8
4	7.0	8.2	12	14	275	105	190	125	105	44	14	9.2
5	7.3	8.2	16	13	240	98	205	138	98	42	13	9.2
6	7.0	8.2	12	14	240	87	175	138	98	40	13	8.6
7	7.0	7.6	10	14	240	80	175	138	90	36	14	8.6
8	7.6	7.0	11	15	258	76	175	150	87	34	13	9.2
9	7.9	7.6	11	14	315	76	162	222	82	34	14	8.6
10	7.6	8.2	16	14	382	76	175	315	79	32	13	8.6
11	7.6	7.9	18	14	240	76	175	450	76	30	13	9.2
12	7.0	7.6	16	15	90	76	190	405	73	29	13	9.8
13	6.8	7.3	14	21	82	77	205	600	71	30	14	8.6
14	6.6	7.6	11	73	76	82	190	628	67	28	13	8.6
15	7.0	7.9	10	28	76	90	175	428	63	30	14	8.6
16	6.8	7.9	11	27	105	105	175	338	61	26	13	8.6
17	7.3	8.2	14	25	210	115	205	405	63	26	13	7.5
18	9.4	8.2	11	21	360	125	210	360	61	23	13	7.5
19	8.2	7.6	10	21	275	125	210	315	56	23	13	7.8
20	11	8.2	10	18	240	125	240	275	56	21	12	7.5
21	9.4	7.6	9.4	14	175	125	240	222	52	21	13	7.2
22	7.0	7.6	9.4	12	125	138	258	205	51	21	12	7.2
23	7.0	7.6	9.7	11	125	138	258	222	51	20	12	7.2
24	6.6	7.6	10	10	125	150	205	275	49	21	13	7.8
25	7.0	7.6	9.7	15	115	150	190	222	51	20	12	10
26	6.8	8.2	9.7	14	105	138	190	190	51	20	10	8.6
27	7.0	8.2	10	22	105	138	205	175	49	19	9.8	8.6
28	7.3	9.4	9.4	105	125	275	205	175	44	18	9.8	8.6
29	7.6	9.7	9.4	115	.....	222	190	162	42	20	9.8	8
30	10	9.4	9.4	105	.....	190	162	162	42	20	9.2	7.8
31	9.7	.....	10	150	.....	175	.....	150	.....	20	9.8	.....

NOTE.—Discharge determined from two rating curves as follows: Oct. 1 to May 14, well defined; May 15 to Sept. 30, well defined above 20 second-feet. Discharge, Sept. 16 and 17, estimated.

Monthly discharge of South Fork of Mokelumne River near Railroad Flat, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	14	6.6	7.69	473	B.
November	11	7.0	8.20	488	B.
December	19	9.4	11.5	707	B.
January	150	9.4	31.1	1,910	A.
February	382	76	198	11,000	A.
March	275	76	122	7,500	A.
April	258	162	198	11,800	A.
May	628	125	259	15,900	A.
June	138	42	71.2	4,240	A.
July	44	18	28.2	1,730	A.
August	18	9.2	12.7	781	B.
September	11	7.2	8.58	511	B.
The year	628	6.6	78.8	57,000	

Digitized by Google

LICKING FORK OF MOKELUMNE RIVER NEAR RAILROAD FLAT, CAL.

LOCATION.—In the E ½ SE. ¼ sec. 26, T. 6 N., R. 14 E., at Mokelumne forest ranger station, 100 feet above mouth of Big Canyon Creek, and 6½ miles east of Railroad Flat, Calaveras County. Licking Fork joins the South Fork 6 miles below the station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 23, 1911, to September 30, 1915 (incomplete).

GAGE.—Until June 3, 1915, vertical staff on left bank 300 feet above the ranger station. June 4, 1915, it was moved downstream 160 feet and spiked to an alder tree, 2 feet in diameter, on left bank, and with a new datum. Gage read once a day by rangers, Fowler or Lewis.

DISCHARGE MEASUREMENTS.—Made from foot log near gage or by wading.

CHANNEL AND CONTROL.—Bed of channel composed of boulders and gravel is rough. Control for old gage shifted during high water and was easily obstructed with leaves and débris at low water. Control for new gage is much better and fairly permanent. Both banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.28 feet (old gage) at 7.20 a. m. May 13 (discharge, 40 second-feet); minimum stage recorded, 1.81 feet (new gage) September 28 to 30 (discharge, 1.3 second-feet).

1911–1915: Maximum stage recorded, 2.4 feet January 25, 1914; minimum stage recorded, 0.25 foot June 1 to 10, 1914; discharge unknown.

DIVERSIONS.—An irrigation ditch (capacity of 1 second-foot) heads above the station.

REGULATION.—None.

ACCURACY.—Results fair for old gage and excellent for new gage.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Licking Fork of Mokelumne River near Railroad Flat, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.[a]	Gage height.[b]	Discharge.
		Feet.	*Feet.*	*Sec.-ft.*
Oct. 28	Roger C. Rice		−0.08	1.7
June 4	H. J. Tompkins		.52	15
4	....do	2.59	.51	12

[a] New gage installed June 4, 1915. [b] Old gage.

Digitized by Google

Daily discharge, in second-feet, of Licking Fork of Mokelumne River near Railroad Flat, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1				24	18	15	5.6	2.4	1.8
2				25	18	14	5.3	2.4	1.8
3				26	18	14	5.2	2.4	1.8
4				26	19	11	5.1	2.4	1.8
5				26	20	11	4.9	2.4	1.9
6				26	19	11	4.9	2.4	1.9
7				26	18	10	4.7	2.4	1.8
8				26	18	10	4.5	2.4	1.8
9		3.5		25	21	10	4.3	2.3	1.7
10				26	24	9.9	4.2	2.3	1.6
11				27	27	9.7	4.2	2.2	1.6
12				26	26	9.3	4.0	2.1	1.6
13				26	39	8.9	4.0	2.1	1.6
14				24	33	8.5	4.0	2.0	1.6
15				24	30	8.1	4.0	1.9	1.5
16				25	32	7.8	3.9	1.8	1.5
17				25	33	7.4	3.8	1.8	1.4
18				25	31	7.1	3.7	1.8	1.5
19				26	29	7.0	3.6	1.7	1.5
20				25	27	6.8	3.5	1.7	1.4
21				25	26	6.7	3.4	1.8	1.5
22				24	25	6.6	3.2	1.8	1.5
23				22	25	6.5	3.1	1.8	1.5
24			27	21	24	6.5	3.0	1.8	1.4
25			25	20	22	6.3	2.9	1.8	1.4
26			25	20	20	6.2	2.8	1.7	1.3
27			24	19	20	6.0	2.8	1.7	1.3
28	1.7		25	19	19	5.9	2.7	1.8	1.3
29			26	19	18	5.9	2.6	1.8	1.3
30			25	19	17	5.8	2.5	1.8	1.3
31			25	.....	16	.....	2.4	1.8	.....

NOTE.—Discharge determined from two rating curves as follows: Oct. 28 to June 3, fairly well defined below and poorly defined above 20 second-feet; June 4 to Sept. 30, well defined. No record Oct. 1 to Mar. 23.

Monthly discharge of Licking Fork of Mokelumne River near Railroad Flat, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March 24-31	27	24	25.2	400	B.
April	27	19	23.9	1,420	C.
May	39	16	23.6	1,450	C.
June	15	5.8	8.63	514	B.
July	5.6	2.4	3.83	236	A.
August	2.4	1.7	2.02	124	A.
September	1.8	1.3	1.56	93	A.
The period				4,240	

NORTH FORK OF COSUMNES RIVER NEAR EL DORADO, CAL.

LOCATION.—In sec. 23, T. 9 N., R. 10 E., at suspension footbridge at Celio's ranch,[1] 4 miles above junction with Middle Fork and 5 miles south of El Dorado, El Dorado County. Martinez Creek enters about 1½ miles above the station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 13, 1911, to September 30, 1915.

[1] "Kings Store" on map of Placerville quadrangle, U. S. Geological Survey.

Digitized by Google

GAGE.—Staff in three sections on right bank at the bridge; read once a day by James Yates. A temporary gage at same location (datum 1.0 foot higher) was used August 13 to September 23, 1911.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Gravel and solid rock; appear permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.0 feet at 2 p. m. February 2 (discharge, 2,550 second-feet); minimum stage recorded, 2.90 feet October 1 to 3 (discharge, 3.5 second-feet).

1911–1915: Maximum stage recorded, 14.2 feet, January 25, 1914 (discharge, 6,930 second-feet); minimum stage recorded, 2.85 feet, August 19 to September 9 and September 14 to 17, 1914 (discharge, 2 second-feet).

WINTER FLOW.—Stage-discharge relation very slightly, if ever, affected by ice.

DIVERSIONS.—The J. J. Crawford ditch diverts water from Camp Creek, above the station. This is a small ditch, about 2 feet wide. The water is used for irrigation purposes below Placerville.

REGULATION.—None.

ACCURACY.—Rating curve, which is well defined except for extremely high and low water, has been applicable since July 1, 1912. Interpolated discharges did not come at critical times and have not affected the accuracy appreciably. Results good.

No discharge measurements were made at this station during the year ending September 30, 1915.

Daily discharge, in second-feet, of North Fork of Cosumnes River near El Dorado, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.5	17	17	26	1,890	610	568	401	490	85	17	5.1
2	3.5	17	17	23	2,550	490	528	384	454	85	17	5.1
3	3.5	a 17	49	23	1,140	384	568	368	418	78	17	a 5.3
4	4.5	17	85	49	610	352	695	384	384	72	16	5.5
5	5.1	14	85	39	401	322	695	418	368	72	14	5.5
6	5.1	14	49	a 44	322	293	695	337	384	66	12	5.5
7	5.1	11	44	49	266	a 293	610	352	368	60	11	a 5.3
8	5.5	11	39	114	695	293	652	368	352	a 57	11	5.1
9	5.5	11	a 44	99	1,080	280	652	368	322	54	11	4.5
10	5.5	11	49	72	1,820	293	610	2,030	322	49	11	4.5
11	5.5	11	49	54	830	308	652	1,890	322	49	11	4.5
12	5.5	11	39	85	490	293	695	1,830	293	49	11	4.5
13	5.5	11	30	72	384	280	695	1,820	293	44	11	4.5
14	5.5	11	30	490	322	293	652	1,080	206	39	11	4.5
15	5.5	11	39	266	a 466	293	610	1,190	240	a 36	11	5.1
16	a 5.5	a 12	39	130	610	384	652	1,190	215	34	11	5.1
17	5.5	a 13	39	85	1,080	418	a 674	1,360	215	30	9.9	5.1
18	8.2	a 14	34	72	1,080	454	695	1,300	191	30	a 9.0	5.1
19	14	a 15	30	72	740	454	695	1,360	191	30	8.2	5.1
20	14	17	30	a 63	925	490	740	975	169	30	6.6	4.5
21	26	14	26	54	610	528	652	875	169	26	5.5	4.5
22	23	11	23	54	a 550	528	610	785	159	26	5.5	a 4.5
23	23	11	a 23	51	490	568	610	a 830	149	26	5.5	4.5
24	17	11	a 23	51	454	568	568	875	a 140	23	5.5	4.5
25	11	11	23	51	418	a 589	528	695	130	23	5.5	5.5
26	11	11	26	54	384	610	528	610	122	23	5.5	5.5
27	a 11	11	30	54	352	695	454	610	114	20	5.5	5.5
28	11	11	30	203	695	1,420	418	610	99	a 18	5.5	6.6
29	11	18	30	215	.....	875	384	568	92	17	5.5	5.5
30	20	17	26	266	.....	695	490	568	85	17	5.5	5.5
31	17	.....	30	322	.....	610	.....	528	.....	17	5.1	.....

a Estimated from interpolated values.

NOTE.—Discharge determined from a rating curve well defined between 100 and 3,000 second-feet.

Digitized by Google

Monthly discharge of North Fork of Cosumnes River near El Dorado, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	26	3.5	9.76	600	D.
November	18	11	13.1	780	D.
December	85	17	36.4	2,240	C.
January	490	23	107	6,580	A.
February	2,550	266	795	44,200	A.
March	1,420	280	483	29,700	A.
April	740	384	609	36,200	A.
May	2,030	337	891	54,800	A.
June	490	85	251	14,900	A.
July	85	17	41.5	2,550	B.
August	17	5.1	9.57	588	D.
September	6.6	4.5	5.05	300	D.
The year	2,550	3.5	267	193,000	

COSUMNES RIVER AT MICHIGAN BAR, CAL.

LOCATION.—In the NW. ¼ SE. ¼ sec. 36, T. 8 N., R. 8 E., at highway bridge at Michigan Bar, Sacramento County, 5½ miles southwest of Latrobe. The North and Middle forks unite 12 miles above the station.

DRAINAGE AREA.—524 square miles.

RECORDS AVAILABLE.—October 20, 1907, to September 30, 1915.

GAGE.—Vertical staff on downstream end of bridge pier, near left bank; read twice a day by C. B. Ruman.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Sand, gravel, and small boulders; fairly permanent. Point of zero flow is at gage height 1.4 feet ± 0.1 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.5 feet at 5 p. m. February 2 (discharge, 8,200 second-feet); minimum stage recorded, 2.0 feet, September 1 to 7 (discharge, 6 second-feet).

1907–1915: Maximum stage recorded, 10.9 feet, January 31, 1911 (discharge, 22,400 second-feet); no flow July 25 to September 16, 1908.

DIVERSIONS.—Douglas and Enterprise ditches (combined capacity about 50 second-feet) divert from the Middle and South forks. The water is used for power, domestic, and irrigation purposes at Plymouth and vicinity. Slug Gulch ditch (capacity 7 or 8 second-feet) also diverts water from the Middle Fork when prior appropriations permit. Michigan Bar canal (capacity about 50 second-feet) heads on the main Cosumnes at Musicdale Creek. No record is available showing the amount of water diverted.

ACCURACY.—No discharge measurements were made at this station during the year, but measurements made after September 30, 1915, indicate that there has been a change in the stage-discharge relation for stages below about 120 second-feet. Results excellent except those for October and November which are fair, and those for August and September which are good.

Digitized by Google

Daily discharge, in second-feet, of Cosumnes River at Michigan Bar, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6.5	33	34	68	4,470	1,220	1,050	850	1,050	192	29	6
2	6.5	35	35	68	5,920	1,050	1,050	760	950	175	29	6
3	8	40	108	68	3,450	950	1,050	718	850	160	29	6
4	8	40	230	175	1,700	850	1,220	718	760	145	20	6
5	6.5	35	175	140	1,160	805	1,410	760	760	145	20	6
6	6.5	35	145	218	850	718	1,220	718	760	120	20	6
7	6.5	26	120	206	718	760	1,160	675	760	120	20	6
8	8	26	115	480	2,190	675	1,340	718	675	120	20	7.5
9	8	26	87	460	5,920	675	1,160	760	675	116	20	7.5
10	8	26	210	250	5,920	595	1,160	2,760	595	98	14	7.5
11	12	24	272	175	2,460	595	1,160	2,980	595	98	14	7.5
12	12	24	160	230	1,340	595	1,280	3,700	525	98	14	7.5
13	12	24	115	210	1,100	595	1,160	3,950	525	98	14	7.5
14	12	24	85	1,550	950	595	1,160	2,760	492	84	14	8.9
15	12	24	72	595	850	675	1,100	2,190	460	80	14	9
16	12	24	60	345	850	718	1,160	2,020	430	80	14	9
17	15	26	120	250	1,700	805	1,280	2,190	460	64	14	9
18	15	26	132	210	2,760	950	1,280	2,370	400	64	14	9
19	15	26	100	175	1,860	950	1,280	2,560	356	64	14	9
20	18	26	492	160	2,760	950	1,280	1,860	345	64	14	9
21	22	26	132	145	1,860	950	1,220	1,700	345	54	14	8
22	57	26	95	145	1,550	950	1,050	1,550	345	51	9	7.5
23	37	26	79	120	1,340	1,050	950	1,410	295	51	9	7.5
24	33	26	79	120	1,280	1,050	950	1,550	286	45	9	9
25	26	26	75	145	1,100	1,050	850	1,410	250	39	9	7.5
26	26	26	75	145	950	1,050	805	1,280	250	39	9	12
27	22	26	85	175	850	1,050	760	1,280	250	39	9	8.5
28	18	26	75	1,100	1,780	1,100	760	1,280	234	39	9	11
29	18	26	75	760	.....	1,550	760	1,100	210	39	9	9
30	18	28	69	1,000	.....	1,280	1,050	1,050	210	34	9	9
31	20	.....	68	1,160	.....	1,160	.....	1,050	.....	34	9	.....

NOTE.—Discharge, Oct. 1 to July 8, determined from a rating curve well defined above and fairly well defined below 50 second-feet; curve used after July 8 well defined; curves identical above 120 second-feet.

Monthly discharge of Cosumnes River at Michigan Bar, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	57	6.5	16.3	1,000	C.
November	40	24	27.7	1,650	B.
December	492	34	122	7,500	A.
January	1,550	68	356	21,900	A.
February	5,920	718	2,130	118,000	A.
March	1,550	595	904	55,600	A.
April	1,410	760	1,100	65,500	A.
May	3,950	675	1,630	100,000	A.
June	1,050	210	503	29,900	A.
July	192	34	85.5	5,260	A.
August	29	9	15.0	922	B.
September	12	6	7.95	473	B.
The year	5,920	6	565	408,000	

GOOSE LAKE BASIN.

DREWS CREEK RESERVOIR NEAR LAKEVIEW, OREG.

LOCATION.—Dam is in the SE. ¼ sec. 5, T. 40 S., R. 18 E., about 14 miles southwest of Lakeview, Lake County; reservoir extends upstream about 10 miles.

RECORDS AVAILABLE.—February 26, 1913, to September 30, 1915; occasional readings.

GAGE.—Gage face attached to plank on upstream face of dam in 1915. Previous

Digitized by Google

readings obtained by measuring down from the floor of gage house. Gage heights refer to a datum level with lowest contour of reservoir. Gage reader, R. J. Gilbert.

OUTLETS.—A tunnel with sill at elevation 16.3 feet and a blow-out pipe in center of dam at bottom.

REGULATION.—Reservoir was filled up to outlet tunnel during winter of 1911–12, but was practically empty October 1, 1912. The rate of filling between that date and March 31, 1913, has been estimated.

EXTREMES OF STAGE.—Maximum stage recorded during year, 41.3 feet October 3 (quantity stored, 18,480 acre-feet); minimum stage recorded, 24.4 feet September 28 (quantity stored, 1,560 acre-feet).

1913–1915: Maximum stage recorded, 53.4 feet April 18–20, 1914 (quantity stored, 55,500 acre-feet).

The following readings, near the end of each month, have been used in correcting the observed flow of Drews Creek below the dam:

Readings used in correcting observed flow of Drews Creek below dam during year ending Sept. 30, 1915.

Date.	Gage height.	Storage.	Loss or gain during month.	Date.	Gage height.	Storage.	Loss or gain during month.
	Feet.	*Acre-feet.*	*Acre-feet.*		*Feet.*	*Acre-feet.*	*Acre-feet.*
Oct. 31	41.3	18,480	.....	May 29	36.0	9,310	+2,120
Jan. 30	39.0	14,000	[a] −4,480	July 3	34.8	7,780	−1,530
Feb. 27	35.7	8,920	−5,080	July 31	32.9	5,710	−2,070
Mar. 31	34.8	7,780	−1,140	Aug. 31	28.2	2,620	−3,090
Apr. 30	34.3	7,190	− 590	Sept. 28	24.4	1,560	−1,060

[a] Oct. 1 to Jan. 31.

DREWS CREEK NEAR LAKEVIEW, OREG.

LOCATION.—In the SW. ¼ sec. 4, T. 40 S., R. 18 E., at highway bridge about half a mile below mouth of Willow Creek, 1 mile below the Drews Creek dam, and 13 miles southwest of Lakeview, Lake County.

DRAINAGE AREA.—211 square miles.

RECORDS AVAILABLE.—January 16, 1909, to September 30, 1915.

GAGE.—Friez water-stage recorder since March 19, 1912, referred to a vertical staff on the highway bridge, installed March 1, 1910. Gage inspected by R. J. Gilbert. Inclined staff at station No. 1, at the dam site a mile above present gages, used January 16 to May 31, 1909, and vertical staff at station No. 2, at a dump-car bridge 100 feet below the dam site, November 20, 1909, to February 28, 1910.

DISCHARGE MEASUREMENTS.—Made from wagon bridge or by wading.

CHANNEL AND CONTROL.—Gravel and sand; shifts slightly: drift and growth of aquatic plants may collect on control occasionally, affecting stage-discharge relation. At highest stages water flows in a second channel.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 4.31 feet at 1 p. m. March 31 (discharge, 441 second-feet); minimum stage from water-stage recorder, 1.90 feet at 11 a. m. September 23 (discharge, 1 second-foot or less).

1909–1915: Maximum stage recorded, 8.3 feet January 16, 1909, on original gage (discharge, 2,730 second-feet). Creek dry at times.

WINTER FLOW.—Stage-discharge relation has not been affected by ice since water has been stored in reservoir, as the water flowing past the station comes from near the bottom of the reservoir and is well above the freezing point.

Digitized by Google

DIVERSIONS.—The North Drews canal of the Goose Lake Valley Irrigation Co. diverts water past the station. Record is kept of its discharge, and this is added to secure the total run-off from the creek.

REGULATION.—Beginning with the last part of 1912, water has been stored in the reservoir of the Goose Lake Valley Irrigation Co., just above the station. A negligible quantity of water was stored prior to that time. The run-off records have been corrected for storage. The results are often negative during the summer as the discharge into the reservoir becomes too small to offset the evaporation losses.

ACCURACY.—Results for 1915 only fair on account of shifting control and lack of sufficient measurements. Prior to construction of the dam, records were subject to considerable error on account of diurnal fluctuation.

Discharge measurements of Drews Creek near Lakeview, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Dec. 8	James E. Stewart	2.18	12.1
May 8	P. V. Hodges	2.10	12.2

Daily discharge, in second-feet, of Drews Creek near Lakeview, Oreg., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	Aug.	Sept.
1	26	23	.....	16	15	47	409	12	12	.....	10
2	26	23	.....	13	60	46	412	12	12	.....	5
3	26	24	.....	11	96	52	412	12	12	.....	4
4	25	25	.....	11	84	52	402	12	12	.....	4
5	25	24	.....	11	54	52	399	12	12	.....	.....
6	24	23	.....	11	50	52	394	12	13	.....	.....
7	24	23	.....	11	50	52	329	12	14	.....	.....
8	24	23	12	12	48	62	267	12	14	.....	.....
9	25	23	.....	11	50	76	238	12	15	.....	.....
10	25	23	.....	11	48	76	210	12	16	.....	.....
11	25	23	.....	11	46	75	164	12	16	.....	.....
12	25	23	.....	11	47	75	134	12	16	.....	.....
13	25	23	.....	10	49	78	24	12	17	.....	.....
14	25	22	.....	11	47	82	21	12	17	.....	.....
15	25	22	.....	11	46	92	22	12	17	.....	.....
16	24	21	.....	11	46	120	22	12	17	.....	.....
17	24	.....	16	11	47	158	22	12	17	.....	.....
18	24	.....	16	11	47	181	14	12	17	.....	.....
19	25	.....	16	11	48	212	14	12	18	.....	.....
20	24	.....	16	11	48	253	13	12	17	.....	.....
21	24	.....	15	10	48	326	13	12	7.2	.....	.....
22	24	.....	15	10	48	334	12	12	4.8	.....	.....
23	24	.....	15	10	48	347	13	12	.....	.....	.....
24	24	.....	16	10	48	399	12	12	.....	.....	.....
25	24	.....	16	10	48	381	12	12	.....	70	.....
26	25	.....	16	10	47	425	12	12	.....	140	.....
27	25	.....	16	10	47	425	12	12	.....	130	.....
28	24	.....	16	10	47	425	12	12	.....	130	.....
29	24	.....	16	10	.....	417	12	12	.....	114	.....
30	24	.....	16	10	.....	415	12	12	.....	35	.....
31	23	.....	16	10	.....	407	.....	12	.....	31	.....

NOTE.—Discharge determined as follows: Oct. 1 to Mar. 14, from a fairly well-defined rating curve; Mar. 15-20, by indirect method for shifting channels; Mar. 21 to June 22, from a fairly well-defined rating curve, which has also been used Aug. 25 to Sept. 4 after deducting 0.15 foot from observed gage readings to allow for probable backwater owing to growth of aquatic plants in channel. Mean discharge estimated as follows: Nov. 17-30, 17 second-feet; Dec. 1-7 and 9-16, 14 second-feet; June 23-30, 4 second-feet; Aug. 1-27, 2.5 second-feet; Sept. 5-30, 1.5 second-feet. Stage-discharge relation affected by growth of aquatic plants June 23 to Sept. 30, but flow may be safely assumed to have gradually decreased except Aug. 25 to Sept. 4, when water was released from the gates.

Digitized by Google

Monthly discharge of Drews Creek near Lakeview, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	26	23	24.5	1,510	B.
November	25	.....	20.2	1,200	C.
December	.....	.....	14.8	910	D.
January	16	10	10.9	670	B.
February	96	15	50.2	2,790	B.
March	425	46	200	12,300	B.
April	412	12	135	8,030	B.
May	12	12	12.0	738	B.
June	18	.....	11.5	684	C.
July	.....	.....	[a] 3.0	184	D.
August	140	.....	22.9	1,410	C.
September	10	.....	2.1	125	C.
The year	425	.....	42.2	30,600	

[a] Estimated.

NOTE.—Total run-off of Drews Creek for year, including North Drews Canal and deducting draft from reservoir, was 26,100 acre-feet.

NORTH DREWS CANAL NEAR LAKEVIEW, OREG.

LOCATION.—In sec. 3, T. 40 S., R. 18 E., nearly opposite the station on Drews Creek, about two miles below the intake of the canal at the Drews Creek dam and one-third mile above a spillway.

RECORDS AVAILABLE.—March 18, 1914, to September 30, 1915.

GAGE.—Vertical staff on right side of flume at station 107. A gage just below outlet gate of dam was also read during 1915. Gages read once a day by R. J. Gilbert.

DISCHARGE MEASUREMENTS.—Made from collar of flume or by wading.

CHANNEL AND CONTROL.—12-foot wooden flume. Practically all readings in 1914 were made when wasteway below gage was open.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.85 feet April 10 (discharge, 76 second-feet); no flow August 9 and 10.

1914–15: Maximum discharge 102 second-feet (gage height, 2.10 feet on gage above weir) March 28, 1914. Canal dry at times.

ACCURACY.—Results fair except October to December, when they are poor on account of lack of gage records.

North Drews canal diverts from Drews Creek at reservoir dam in the SE. ¼ sec. 5. Water will be used for irrigation, but during 1915 most of it was wasted into creek below the gages on both canal and creek.

Discharge measurements of North Drews canal near Lakeview, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Dec. 8	James E. Stewart	0.32	2.8
May 8	P. V. Hodges	[a] .40	4.3

[a] Reading on gage at dam, 0.60 foot.

Digitized by Google

Daily discharge, in second-feet, of North Drews canal near Lakeview, Oreg., for the year ending Sept. 30, 1915.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1				28	62	4.0	4.6	10	10	14
2			41	23	62	4.2	4.6	10	10	16
3				27	62	4.3	4.6	10	10	16
4				27	62	4.3	10	10	10	16
5				27	62	4.3	10	11	10	16
6		24		35	58	4.3	4.3	11	10	16
7			41	45	58	4.3	4.3	11	10	15
8	3.0			50	53	4.3	4.3	12	10	15
9		24	32	53	43	4.4	4.3	12	0	15
10				53	76	4.6	4.3	12	0	14
11				53	74	4.6	6.3	12		14
12		23	28	53	53	4.6	8.2	12		14
13			29	53	18	4.6	2.7	12		14
14				59	46	4.6	2.7	12	19	14
15				65	46	4.6	2.7	12		12
16				57	46	4.6	4.3	12		6
17			29	71	46	4.6	5.5	11		6
18				66	28	4.6	5.5	13		6
19		23		66	9	4.6	5.5	13		7
20			29	33	8	4.6	10	15		8
21				33	7	4.6	10	14	19	8
22	16			33	6	4.6	10	15	19	8
23		23	29	38	5	4.6	10	10	32	8
24	28			60	4.3	4.6	10	10	46	8
25				55	4.2	4.6	10	8.5	35	8
26		23	30	66	4.0	4.6	8.5	10	23	8
27	28		29	66	4.0	4.6	8.5	10	23	8
28				66	4.0	4.6	8.5	10	23	8
29				66	4.0	4.6	10	10	23	8
30				66	4.0	4.6	10	10	18	7
31				62		4.6		10	13	

NOTE.—Discharge determined from readings on regular gage and a well-defined rating curve Dec. 8-27, Feb. 12, Feb. 27 to June 16, and Aug. 14 to Sept. 30; from readings on gage at dam and a fairly well-defined rating curve, January and February, except Feb. 12, 27-28, and June 17 to Aug. 8. A correction has been made for effect of growth of aquatic plants July 18 to Aug. 8. Mean discharge July 11-20 estimated as 19 second-feet.

Monthly discharge of North Drews canal near Lakeview, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October			[a] 2.0	123	D.
November			[a] 3.0	179	D.
December	28		10.3	633	C.
January	34		23.7	1,460	B.
February	41	29	32.4	1,800	B.
March	71	23	50.2	3,090	B.
April	76	4.0	34.0	2,020	B.
May	4.6	4.0	4.50	277	B.
June	10	2.7	6.81	405	C.
July	15	8.5	11.3	695	C.
August	46	0	17.5	1,080	C.
September	16	6.0	11.1	660	B.
The year	76	0	17.1	12,400	

[a] Estimated.

COTTONWOOD CREEK NEAR LAKEVIEW, OREG.

LOCATION.—In the SW. ¼ sec. 29, T. 38 S., R. 19 E., about half a mile below dam site of a proposed storage reservoir and near edge of valley, and 10 miles northwest of Lakeview, Lake County.

DRAINAGE AREA.—30 square miles.

Digitized by Google

RECORDS AVAILABLE.—November 22, 1908, to September 30, 1915.

GAGE.—Vertical staff on left bank; read once daily by Peter Segner. From November 22, 1908, to January 18, 1909, a gage just above a weir, one-fourth mile below the dam site, was used.

DISCHARGE MEASUREMENTS.—Made from a footbridge 40 feet below the present gage or by wading near the gage.

CHANNEL AND CONTROL.—Clean gravel; somewhat shifting; stage of zero flow, -0.1 ± 0.1 foot.

EXTREME OF DISCHARGE.—Maximum stage recorded during year, 2.2 feet March 23 and 27 (discharge, 149 second-feet); minimum stage recorded, 0.15 foot August 28 to September 9 (discharge, 1.5 second-feet).

1908–1915: Maximum stage recorded, 3.4 feet November 23, 1909 (discharge, 337 second-feet); minimum discharge of 1.0 second-foot has been noted in 1909, 1910, 1913, and 1914.

WINTER FLOW.—Stage discharge relation seriously affected by ice; flow estimated.

DIVERSIONS.—At present no diversions above station.

ACCURACY.—Results good except for period when stream was frozen and during spring, when there is a large diurnal fluctuation due to melting snow.

The following measurement was made by P. V. Hodges:

May 7, 1915: Gage height, 0.64 foot; discharge, 23.2 second-feet.

Daily discharge, in second-feet, of Cottonwood Creek near Lakeview, Oreg., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.0	3.5	5.0	60	32	35	9.0	5.0	2.0
2	2.0	3.5	5.0	112	35	32	9.0	5.0	1.2
3	2.0	3.5	5.0	87	28	32	9.0	3.5	1.2
4	2.0	3.5	7.0	69	32	32	7.0	3.5	1.2
5	2.0	3.5	12	74	32	28	7.0	3.5	1.2
6	2.0	3.5	9.0	47	21	24	7.0	3.5	1.2
7	2.0	5.0	7.0	69	35	21	7.0	3.5	1.2
8	2.0	5.0	7.0	43	28	21	7.0	3.5	1.2
9	2.0	5.0	5.0	47	60	18	7.0	3.5	1.2
10	5.0	5.0	7.0	47	69	21	7.0	2.0	1.2
11	5.0	5.0	7.0	60	64	21	7.0	2.0	2.0
12	5.0	3.5	7.0	64	60	18	7.0	2.0	1.2
13	5.0	3.5	7.0	60	47	18	7.0	2.0	2.0
14	5.0	7.0	7.0	64	60	18	7.0	2.0	2.0
15	5.0	9.0	9.0	43	47	18	7.0	2.0	3.5
16	5.0	7.0	9.0	39	43	18	7.0	2.0	3.5
17	7.0	7.0	47	43	43	18	7.0	2.0	3.5
18	7.0	7.0	161	56	74	12	3.5	2.0	3.5
19	12	12	161	43	47	9.0	5.0	2.0	3.5
20	9.0	15	139	60	43	15	5.0	2.0	3.5
21	7.0	15	166	43	39	12	5.0	2.0	2.0
22	5.0	15	161	43	43	12	7.0	2.0	2.0
23	5.0	9.0	172	39	39	12	3.5	2.0	2.0
24	5.0	7.0	69	35	47	12	3.5	2.0	2.0
25	5.0	9.0	92	35	39	9.0	3.5	2.0	2.0
26	3.5	.....	43	39	35	9.0	3.5	2.0	2.0
27	3.5	.....	172	32	35	9.0	3.5	2.0	3.5
28	3.5	.....	97	43	39	9.0	3.5	1.2	5.0
29	5.0	.....	97	39	39	9.0	3.5	1.2	3.5
30	3.5	.....	56	39	35	9.0	3.5	1.2	3.5
31	3.5	.....	117	.....	32	.....	3.5	1.2	.....

NOTE.—Discharge determined from a fairly well defined rating curve. Stage-discharge relation affected by ice about Nov. 26 to Feb. 28. Mean discharge estimated Nov. 26–30, 7 second-feet; Dec. 1–15, 5 second-feet; Dec. 16–25, 3 second-feet; Dec. 26 to Jan. 15, 5 second-feet; Jan. 16 to Feb. 28, 4 second-feet. Large diurnal fluctuation during parts of March and April; gage read alternately morning and evening.

Digitized by Google

Monthly discharge of Cottonwood Creek near Lakeview, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	12	2.0	4.44	273	B.
November	15	3.5	6.9	411	C.
December	.....	.....	4.4	271	C.
January	.....	.....	4.5	277	C.
February	.....	.....	4.0	222	C.
March	172	5	60.2	3,700	C.
April	112	32	52.5	3,120	B.
May	74	21	42.6	2,620	B.
June	35	9	17.7	1,050	B.
July	9	3.5	5.87	361	B.
August	5	1.2	2.43	149	C.
September	5	1.2	2.31	137	C.
The year	172	1.2	17.4	12,600	

THOMAS CREEK NEAR LAKEVIEW, OREG.

LOCATION.—In the NE. ¼ sec. 22, T. 38 S., R. 19 E., at site of proposed diversion dam, near edge of valley, about 8 miles below the Thomas Creek reservoir, and about 10 miles northwest of Lakeview, Lake County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 1, 1912, to September 30, 1915.

GAGE.—Vertical staff driven in creek bed near left bank, 300 feet above highway bridge; read daily in flood periods and twice a week at other times by George Wright. Gage readings beginning April 13, 1914, refer to a datum 0.46 foot lower than that previously used. Gage used January 1 to March 9, 1912, and December 1, 1912, to February 29, 1913, was on right abutment of bridge over southernmost of three channels, into which creek divides at the road crossing.

DISCHARGE MEASUREMENTS.—Made by wading at all but highest stages, when measurements may be made from the highway bridge at the old gage.

CHANNEL AND CONTROL.—Sand, gravel, and yellow clay; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.6 feet April 2 and 3 (discharge, 95 second-feet); minimum stage recorded, 1.28 feet July 6 (discharge, 0.8 second-foot).

1912–1915: Maximum stage recorded, 4.15 feet April 15, 1914 (discharge, 440 second-feet); minimum stage recorded, 1.28 feet July 6, 1915 (discharge, 0.8 second-foot).

WINTER FLOW.—Stage-discharge relation not affected by ice owing to springs above the gage.

DIVERSIONS.—Two small irrigation ditches divert water around gage.

ACCURACY.—Results only fair on account of unstable channel, diurnal fluctuation in the early spring, and infrequency of gage readings.

The following measurement was made by P. V. Hodges:

May 7, 1915: Gage height, 1.70 feet; discharge, 12.5 second-feet.

Digitized by Google

Daily discharge, in second-feet, of Thomas Creek near Lakeview, Oreg., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	.....	.....	.....	5.0	4.8	7.1	2.4	.....	.....	.....	.....
2	.....	.....	.....	4.0	.....	4.7	9.5	2.2	13	.....	.....	.....
3	.....	.....	.....	.....	.....	4.6	9.5	2.0	12	1.0	.....	.....
4	.....	2.4	3.4	.....	.....	4.6	7.0	1.8	.....	.....	1.2	2.0
5	.....	.....	.....	4.0	.....	4.6	4.4	1.7	11	.....	.....	.....
6	.....	.....	.....	.....	5.0	4.6	4.9	1.5	.....	.8	.....	.....
7	.....	2.8	.....	.....	.....	4.7	4.6	1.4	.....	.....	.....	.....
8	3.0	.....	3.4	4.0	.....	4.8	4.4	1.2	6.9	1.0	.....	2.2
9	.....	.....	.....	.....	5.0	5.0	4.0	1.8	7.5	.....	.....	.....
10	.....	.....	.....	.....	.....	5.0	5.1	2.4	.....	1.2	1.2	.....
11	.....	.....	.....	.....	.....	5.0	5.0	3.0	7.5	.....	.....	2.2
12	.....	3.0	4.0	4.6	5.0	5.0	4.9	3.5	5.1	.....	.....	.....
13	.....	.....	.....	.....	.....	5.0	4.9	3.3	.....	2.2	.....	.....
14	.....	.....	.....	.....	.....	6.2	3.3	4.0	.....	.....	1.2	2.2
15	3.0	.....	4.0	.....	.....	7.4	3.8	3.3	5.1	.....	.....	.....
16	.....	.....	.....	4.0	5.0	8.5	4.2	2.9	.....	2.2	.....	.....
17	.....	.....	.....	.....	.....	10	4.2	2.5	2.2	.....	1.2	.....
18	.....	3.0	.....	.....	.....	12	4.1	2.5	.....	.....	.....	2.2
19	.....	.....	4.0	4.0	.....	5.0	4.0	3.1	2.2	.....	.....	.....
20	5.0	.....	.....	.....	5.0	11	4.4	2.5	.....	2.2	.....	.....
21	4.0	.....	.....	.....	.....	12	3.8	2.5	2.2	.....	1.2	2.2
22	.....	.....	.....	.....	.....	12	3.3	2.5	.....	.....	.....	.....
23	.....	.....	3.4	4.0	.....	21	2.9	2.6	2.2	.....	.....	2.2
24	2.8	.....	.....	.....	5.0	24	2.7	2.7	.....	1.6	.....	.....
25	.....	.....	.....	.....	.....	27	2.6	2.7	.....	.....	2.2	.....
26	.....	3.4	3.4	4.6	.....	39	2.5	2.5	1.2	.....	.....	.....
27	.....	.....	.....	.....	5.0	41	2.5	2.2	.....	1.2	.....	.....
28	2.4	.....	.....	.....	.....	54	2.5	1.8	1.6	.....	2.0	.....
29	.....	.....	3.4	4.6	.....	66	2.5	1.8	.....	.....	.....	2.2
30	.....	3.4	.....	.....	.....	61	2.7	1.6	.....	1.2	.....	2.2
31	2.4	.....	.....	.....	.....	52	.....	1.5	.....	.....	2.0	.....

NOTE.—Discharge determined from two fairly well defined rating curves applicable Oct. 1 to Mar. 31 and Apr. 1 to Sept. 30, respectively. Discharge interpolated Mar. 1-2, 4-5, 7-8, 10-12, 14-15, 17, 21, 24, 28, Apr. 4, 11, 15, 18, 25, May 2-3, 6-7, 9-11, 16, 23, 26, and 30.

Monthly discharge of Thomas Creek near Lakeview, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	5.0	2.4	3.23	199	B.
November	3.4	2.4	3.00	179	B.
December	4.0	3.4	3.62	223	B.
January	4.6	4.0	4.20	258	B.
February	5.0	5.0	5.00	278	B.
March	66	4.6	17.1	1,050	C.
April	95	25	43.8	2,610	C.
May	40	12	23.7	1,460	B.
June	13	1.2	5.69	339	B.
July	2.2	.8	1.46	90	C.
August	2.2	1.2	1.52	93	C.
September	2.2	2.0	2.18	130	C.
The year	95	.8	9.54	6,910	

NOTE.—Mean monthly discharge obtained by averaging the daily discharge shown in table of daily discharge.

SACRAMENTO RIVER BASIN.

SACRAMENTO RIVER AT CASTELLA, CAL.

LOCATION.—In sec. 22, T. 38 N., R. 4 W., at private highway bridge at Castella; Shasta County, and about half a mile below the mouth of Castle Creek.

DRAINAGE AREA.—257 square miles.

RECORDS AVAILABLE.—October 15, 1910, to September 30, 1915.

GAGE.—Vertical staff on downstream end of bridge pier near right bank; read once a day by H. O. Wickes.

Digitized by Google

DISCHARGE MEASUREMENTS.—Made from bridge at Sweet Brier camp, one-half mile below gage. This section is more satisfactory than the one at the highway bridge, where early measurements were made.

CHANNEL AND CONTROL.—Rough; composed of small boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.7 feet at 5 p. m. March 28 (discharge, 7,780 second-feet); minimum stage recorded, 2.4 feet at 7 a. m. October 28 and November 8 (discharge, 175 second-feet).

1910–1915: Maximum stage recorded, 13.7 feet at 5.50 a. m. January 2, 1914 (discharge, determined from extension of rating curve, 16,000 second-feet); minimum stage recorded, 2.4 feet at 7 a. m. October 28 and November 8, 1914 (discharge, 175 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Results good.

COOPERATION.—Gage-height record furnished by H. O. Wickes.

Discharge measurements of Sacramento River at Castella, Cal., during the year ending Sept. 30, 1915.

[Made by H. J. Tompkins.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 15	2.62	226
Apr. 27	4.99	2,500
Sept. 5	2.51	242

Daily discharge, in second-feet, of Sacramento River at Castella, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	225	295	212	225	4,530	1,060	2,960	1,960	2,570	975	390	255
2	225	242	212	225	4,610	975	3,090	1,730	2,700	975	390	255
3	225	200	242	225	3,350	975	3,630	1,510	2,080	930	365	255
4	225	188	242	242	1,730	975	3,350	1,400	2,080	888	365	255
5	225	188	242	260	1,300	1,060	2,830	1,300	2,320	805	340	275
6	225	188	260	278	1,060	975	2,440	1,400	2,440	765	317	275
7	225	188	242	315	1,060	930	3,090	1,730	2,700	765	317	275
8	225	175	212	398	1,160	975	2,700	2,080	2,700	728	317	255
9	315	188	242	315	2,320	975	2,440	3,090	2,080	728	317	255
10	335	188	242	260	1,400	975	2,440	5,050	1,840	690	317	255
11	295	188	242	242	1,160	975	2,440	4,750	1,510	690	317	255
12	295	188	242	225	975	1,200	2,960	4,610	1,510	655	317	255
13	260	188	225	260	888	1,300	3,090	3,630	1,510	620	317	255
14	225	188	225	242	765	1,510	2,440	2,320	1,620	620	317	255
15	225	188	212	212	765	1,730	2,320	1,730	1,620	620	317	255
16	225	188	212	212	2,200	1,730	2,440	2,320	1,510	588	295	255
17	1,020	188	212	212	4,050	1,840	3,090	3,350	1,510	588	275	255
18	335	188	212	200	4,470	1,840	3,220	3,220	1,510	588	275	255
19	1,020	188	212	212	2,200	1,620	3,350	2,570	1,510	588	275	255
20	470	188	212	212	1,960	1,840	3,350	2,320	1,400	588	275	255
21	200	188	212	212	1,620	1,840	3,220	2,080	1,250	555	275	255
22	200	188	212	212	1,300	2,080	2,830	1,960	1,250	525	275	255
23	200	188	212	212	1,250	2,440	2,570	2,080	1,250	495	275	255
24	200	188	212	212	1,620	2,570	2,200	2,830	1,160	468	255	255
25	200	188	212	225	1,400	2,440	2,440	2,200	1,060	440	255	255
26	188	188	212	315	1,300	2,440	2,080	2,080	1,020	440	255	255
27	188	188	212	335	1,250	2,960	2,320	1,960	975	415	255	255
28	175	212	212	675	1,110	7,620	2,960	2,830	975	415	255	255
29	175	242	212	710	.....	5,800	3,630	2,570	930	415	255	255
30	242	212	212	1,930	.....	4,470	2,570	2,700	975	415	255	255
31	212	.....	212	1,380	.....	3,630	.....	2,830	.....	415	255	.....

NOTE.—Discharge determined from two rating curves fairly well defined below 3,500 second-feet, applicable Oct. 1 to Feb. 1 and Feb. 2 to Sept. 30, respectively.

Digitized by Google

Monthly discharge of Sacramento River at Castella, Cal., for the year ending Sept. 30, 1915.

[Drainage area, 257 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	1,020	175	290	1.13	1.30	17,800	B.
November	295	175	197	.767	.86	11,700	B.
December	260	212	223	.868	1.00	13,700	B.
January	1,930	200	367	1.43	1.65	22,600	B.
February	4,610	765	1,890	7.35	7.65	105,000	B.
March	7,620	930	2,060	8.02	9.25	127,000	B.
April	3,630	2,080	2,820	11.0	12.27	168,000	B.
May	5,050	1,300	2,520	9.81	11.31	155,000	B.
June	2,700	930	1,650	6.42	7.16	98,200	B.
July	975	415	626	2.44	2.81	38,500	B.
August	390	255	299	1.16	1.34	18,400	B.
September	275	255	257	1.00	1.12	15,300	B.
The year	7,620	175	1,090	4.24	57.72	791,000	

SACRAMENTO RIVER NEAR RED BLUFF, CAL.

LOCATION.—In lot 4, sec. 34, T. 28 N., R. 3 W., at the lower end of Iron Canyon, 4 miles northeast of Red Bluff, Tehama County, and about 3 miles below the proposed Iron Canyon dam site. Paines Creek enters about 3 miles above and Antelope Creek about 7 miles below the station.

DRAINAGE AREA.—9,300 square miles, not including the drainage area of Goose Lake—1,090 square miles—which belongs naturally in Pit River basin but has contributed no water except for a short time in 1869 and for more than two hours during a severe storm from the north in 1881, when the lake overflowed to North Fork of Pit River. Previously published figures of discharge in second-feet per square mile and run-off in depth in inches, based on the drainage area including Goose Lake, should be used with caution because of the large noncontributing area.

RECORDS AVAILABLE.—January 28, 1902, to September 30, 1915. The State engineer in 1879 and the commissioner of public works in 1893 and 1894 made measurements at this point. From April 30, 1895, to June 30, 1902, a gaging station was maintained at Jellys Ferry, 12 miles above Red Bluff.

GAGE.—Staff in seven sections on left bank; read twice a day by Richard Groebe. Several gages have been used at this station, but all observations have been reduced to the present datum. The United States Weather Bureau gage at Red Bluff has often been used.

DISCHARGE MEASUREMENTS.—Made from a cable (Pl. VII, *A*) 50 feet upstream from gage.

CHANNEL AND CONTROL.—Coarse gravel and small boulders; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 34.0 feet at 4 p. m. Feb. 2, 1915 (discharge, 262,000 second-feet); minimum stage recorded, 1.3 feet September 9 to 12 (discharge, 4,880 second-feet).

1902–1915: Maximum stage recorded, 35.2 feet February 3, 1909 (discharge, 278,000 second-feet); minimum stage recorded, 0.9 foot September 7 to 28, 1903 (discharge, 3,980 second-feet).

DIVERSIONS.—A small amount of water is diverted from some of the minor tributaries for irrigation. With this exception the record at this station gives the natural run-off from the basin.

Digitized by Google

A. CABLE SUPPORT ON SACRAMENTO RIVER AT RED BLUFF, CAL.

B. TIMBER WELL AND GAGE HOUSE ON PIT RIVER AT HENDERSON, CAL.

Digitized by Google

Digitized by Google

REGULATION.—No storage of any importance has been developed in the drainage area above the station.

ACCURACY.—Since 1902 there has been no change in the rating curve above gage height 2.3 feet. The maximum change in the low-water portion of the curve at the minimum recorded gage height of 0.9 foot is only 5.0 per cent; results excellent.

Discharge measurements of Sacramento River near Red Bluff, Cal., during the year ending Sept. 30, 1915.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Feb. 4	14.62	65,600	Feb. 5	10.89	42,700	Feb. 9	16.57	77,900
4	13.60	59,500	9	17.36	84,500	10	13.50	59,200

Daily discharge, in second-feet, of Sacramento River near Red Bluff, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5,210	5,880	6,120	6,120	97,600	30,800	45,800	18,200	19,000	8,600	6,090	5,110
2	5,210	6,120	6,370	6,120	249,000	27,600	39,000	16,600	18,200	8,600	5,840	5,110
3	5,210	6,120	9,220	6,370	115,000	24,900	49,200	15,900	17,000	8,300	5,840	5,110
4	5,210	5,880	8,600	7,430	63,000	22,700	38,000	15,100	15,900	8,300	5,840	5,110
5	5,210	5,650	10,900	11,500	42,600	21,400	33,200	14,800	15,500	8,000	5,590	5,110
6	5,210	5,650	10,200	21,000	32,200	20,600	29,900	14,400	15,500	8,000	5,590	5,110
7	5,210	5,650	8,600	27,600	28,000	19,400	29,900	14,400	15,500	8,000	5,590	5,110
8	5,210	5,650	9,540	49,200	68,200	18,600	30,300	14,400	15,100	8,000	5,590	5,110
9	5,650	5,650	8,600	25,800	83,700	18,200	27,600	16,200	14,800	7,710	5,590	4,880
10	6,630	5,650	15,100	16,200	56,200	17,400	25,800	52,100	14,000	7,710	5,590	4,880
11	5,880	5,650	13,700	12,200	40,000	17,400	24,900	61,700	12,900	7,430	5,590	4,880
12	5,650	5,650	9,860	11,900	30,800	18,200	24,900	58,000	12,200	7,150	5,590	4,880
13	5,430	5,650	7,710	14,800	26,200	20,600	28,000	47,000	11,900	7,150	5,590	5,110
14	5,430	5,650	7,430	43,200	22,700	21,400	24,000	37,000	11,500	7,150	5,590	5,110
15	5,430	5,650	6,630	19,400	20,600	22,300	22,700	28,500	11,500	6,880	5,350	5,110
16	5,430	5,650	6,630	16,200	35,100	22,300	22,300	28,000	11,500	6,610	5,350	5,110
17	5,650	5,650	7,430	11,500	52,600	22,300	23,200	33,200	11,500	6,610	5,350	5,110
18	8,300	5,650	6,630	10,200	66,900	22,300	23,200	38,500	11,200	6,610	5,350	5,110
19	8,000	5,650	6,890	9,860	50,900	21,400	22,700	32,200	10,900	6,610	5,350	5,110
20	8,600	5,650	7,710	9,220	46,400	20,600	23,200	28,500	10,500	6,610	5,350	5,110
21	7,160	5,650	6,630	8,910	37,000	19,400	22,300	26,700	10,200	6,350	5,110	5,110
22	6,370	5,650	6,120	8,300	40,600	21,000	22,300	25,400	10,200	6,350	5,110	5,110
23	6,120	5,650	6,120	8,000	44,200	21,000	21,000	23,200	9,860	6,350	5,110	5,110
24	5,880	5,650	6,120	8,300	64,900	22,300	20,200	27,600	9,540	6,090	5,110	5,110
25	5,880	5,430	6,120	8,600	55,600	22,300	21,400	26,700	9,540	6,350	5,110	5,110
26	5,650	5,430	6,120	12,900	41,100	22,300	21,000	24,000	9,220	6,090	5,110	5,110
27	5,650	5,430	6,370	21,900	34,600	23,600	19,800	23,200	9,220	6,090	5,110	5,110
28	5,650	6,890	6,120	40,000	37,000	84,400	18,600	22,700	9,220	6,090	5,110	5,110
29	5,650	6,120	6,120	54,400	.....	80,000	20,600	21,900	8,910	6,090	5,110	5,110
30	5,650	6,120	6,120	50,900	.....	68,900	20,600	20,600	8,910	6,090	5,110	5,110
31	5,650	.....	6,120	60,500	.....	58,000	.....	19,800	.....	6,090	5,110	.....

NOTE.—Discharge determined from two well-defined rating curves applicable Oct. 1 to Feb. 2 and Feb. 3 to Sept. 30.

Digitized by Google

Monthly discharge of Sacramento River near Red Bluff, Cal., for the year ending Sept. 30, 1915.

[Drainage area, 9,300 square miles.]

Month.	Discharge in second-feet.			Run-off.			Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	8,600	5,210	5,910	0.635	0.73	363,000	A.
November	6,890	5,430	5,750	.618	.69	342,000	A.
December	15,100	6,120	7,800	.839	.97	480,000	A.
January	60,500	6,120	20,000	2.15	2.48	1,230,000	A.
February	249,000	20,600	56,500	6.08	6.33	3,140,000	A.
March	84,400	17,400	28,200	3.03	3.49	1,730,000	A.
April	49,200	18,600	26,500	2.85	3.18	1,580,000	A.
May	61,700	14,400	27,300	2.94	3.39	1,680,000	A.
June	19,000	8,910	12,400	1.33	1.48	738,000	A.
July	8,600	6,090	7,030	.756	.87	432,000	A.
August	6,090	5,110	5,410	.582	.67	333,000	A.
September	5,110	4,880	5,080	.546	.61	302,000	A.
The year	249,000	4,880	17,100	1.84	24.89	12,400,000	

PIT RIVER AT HENDERSON, CAL.

LOCATION.—In sec. 36, T. 37 N., R. 1 W., at Big Bend ferry, one-fourth mile above Henderson in Shasta County. Nelson Creek enters half a mile above and Kosk Creek 1 mile below the station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 28, 1910, to September 30, 1915.

GAGE.—Gurley electric water-stage recorder (Pl. VII, *B*) 50 feet below vertical staff fastened to an alder tree on left bank about 100 feet above ferry. Original datum has been maintained. The gages do not read exactly the same on account of the slope of the water surface. Staff gage is the original gage; recorder was set in operation December 28, 1912.

DISCHARGE MEASUREMENTS.—Made from cable 25 feet downstream from water-stage recorder.

CHANNEL AND CONTROL.—Rough; composed of boulders and coarse gravel; fairly permanent. One channel at all stages; banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder record, 2.38 feet at 10.30 p. m. February 2 (discharge, 5,900 second-feet); minimum stage recorded, 0.7 foot August 6 to 31 (discharge, 2,540 second-feet).

1910–1915: Maximum stage recorded, 5.3 feet March 25, 1911 (discharge, 13,200 second-feet); minimum stage recorded, 0.60 foot September 23 to 25, 1913 (discharge, 2,490 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—No information.

REGULATION.—None.

ACCURACY.—Fluctuations in daily flow are remarkably small; results excellent for the range of stage of this year.

COOPERATION.—Staff-gage readings for periods when water-stage recorder was not in operation were furnished by Mount Shasta Power Co., through W. A. Cooper.

Digitized by Google

Discharge measurements of Pit River at Henderson, Cal., during the year ending Sept. 30, 1915.

[Made by H. J. Tompkins.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 20	0.98	3,220	Apr. 18	1.62	4,640	Apr. 22	1.60	4,270
23	.90	3,080	19	1.64	4,340	July 28	.80	2,790

Daily discharge, in second-feet, of Pit River at Henderson, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,850	2,940	2,940	2,780	4,250	4,760	4,530	3,850	3,950	2,860	2,780	2,620
2	2,850	2,940	3,020	2,780	5,720	4,560	4,530	3,850	3,850	2,860	2,620	2,620
3	2,850	2,940	3,020	2,780	5,400	4,350	5,150	3,760	3,760	2,860	2,620	2,620
4	2,850	2,940	3,020	2,780	4,980	4,250	5,040	3,660	3,560	2,860	2,620	2,620
5	2,850	2,940	3,020	2,860	4,660	4,150	5,040	3,660	3,470	2,860	2,620	2,620
6	2,850	2,940	3,020	2,860	4,250	4,050	4,840	3,560	3,470	2,860	2,540	2,620
7	3,020	2,940	2,940	2,940	4,050	4,050	4,630	3,560	3,470	2,860	2,540	2,620
8	3,020	2,940	2,940	3,020	4,560	3,950	4,630	3,470	3,380	2,860	2,540	2,620
9	3,020	2,860	2,940	2,940	5,080	3,850	4,430	3,470	3,290	2,860	2,540	2,620
10	3,020	2,860	2,940	2,860	4,560	3,760	4,430	3,760	3,200	2,860	2,540	2,620
11	3,020	2,860	2,940	2,940	4,250	3,760	4,430	4,350	3,200	2,860	2,540	2,620
12	2,850	2,860	2,940	2,940	3,950	3,760	4,430	4,760	3,110	2,860	2,540	2,620
13	2,850	2,860	2,940	2,940	3,560	3,950	4,430	4,980	3,020	2,860	2,540	2,620
14	2,850	2,860	2,860	2,940	3,560	4,050	4,330	4,980	2,940	2,860	2,540	2,620
15	2,850	2,860	2,780	2,940	3,560	4,130	4,230	5,080	2,940	2,780	2,540	2,620
16	2,850	2,860	2,860	2,860	3,950	4,330	4,350	5,080	3,110	2,780	2,540	2,620
17	2,850	2,860	2,860	2,860	5,080	4,530	4,350	4,870	3,020	2,780	2,540	2,620
18	2,850	2,860	2,860	2,860	5,290	4,530	4,350	4,980	3,020	2,780	2,540	2,620
19	2,850	2,860	2,860	2,860	5,180	4,730	4,350	4,980	2,940	2,780	2,540	2,620
20	2,850	2,860	2,860	2,860	4,980	4,530	4,350	4,870	2,940	2,780	2,540	2,620
21	2,850	2,860	2,780	2,860	4,760	4,330	4,350	4,760	2,940	2,780	2,540	2,620
22	2,940	2,940	2,780	2,780	4,760	4,330	4,250	4,870	2,940	2,780	2,540	2,620
23	2,940	2,860	2,780	2,780	4,760	4,250	4,150	4,660	2,940	2,780	2,540	2,620
24	2,940	2,860	2,780	2,780	4,660	4,250	4,050	4,660	2,940	2,780	2,540	2,620
25	2,940	2,860	2,780	2,780	4,450	4,030	4,050	4,660	2,940	2,780	2,540	2,620
26	2,940	2,860	2,780	2,780	4,350	4,030	4,050	4,660	2,940	2,780	2,540	2,620
27	2,940	2,940	2,780	2,860	4,250	4,130	3,950	4,560	2,940	2,780	2,540	2,620
28	2,940	3,020	2,780	2,940	4,450	4,230	3,950	4,450	2,860	2,780	2,540	2,620
29	2,940	3,020	2,780	3,020	.....	4,330	4,050	4,350	2,860	2,780	2,540	2,620
30	2,940	3,020	2,780	3,200	.....	4,630	3,950	4,250	2,860	2,780	2,540	2,620
31	2,940	.....	2,780	3,470	.....	4,630	.....	4,050	.....	2,780	2,540	.....

NOTE.—Discharge determined from two well-defined rating curves, one for each gage. Water-stage recorder not running Oct. 1–21; Mar. 15–22 and 25 to Apr. 15, and Aug. 2, to Sept. 30; staff gage record obtained for these periods.

Digitized by Google

Monthly discharge of Pit River at Henderson, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	3,020	2,850	2,910	179,000	A.
November	3,020	2,860	2,960	173,000	A.
December	3,020	2,780	2,880	177,000	A.
January	3,470	2,780	2,900	178,000	A.
February	5,720	3,560	4,500	253,000	A.
March	4,760	3,760	4,230	260,000	A.
April	5,150	3,950	4,390	261,000	A.
May	5,080	3,470	4,310	269,000	A.
June	3,950	2,860	3,160	188,000	A.
July	2,860	2,780	2,820	173,000	A.
August	2,780	2,540	2,560	157,000	A.
September	2,620	2,620	2,620	156,000	A.
The year	5,720	2,540	3,350	2,420,000	

PIT RIVER NEAR YDALPOM, CAL.

LOCATION.—In the NW. ¼ sec. 32, T. 34 N., R. 3 W., at Silverthorne Ferry, 1½ miles southwest of Ydalpom, Shasta County, and 7½ miles above junction with Sacramento River. Squaw Creek enters half a mile above and McCloud River 4 miles below the station.

DRAINAGE AREA.—5,260 square miles, not including the drainage area of Goose Lake—1,090 square miles—which belongs naturally in Fit River basin, but has contributed no water except for a short time in 1869 and for more than two hours during a severe storm from the north in 1881, when the lake overflowed to North Fork of Pit River. Previously published figures of discharge in second-feet per square mile and run-off in depth in inches, based on the drainage area including Goose Lake, should be used with caution because of the large noncontributing area.

RECORDS AVAILABLE.—November 16, 1910, to September 30, 1915.

GAGE.—Vertical staff in two sections fastened to an ash tree on left bank 350 feet below ferry, gage read usually once a day by M. D. Rodrigue.

DISCHARGE MEASUREMENTS.—Made from car and cable 50 feet above ferry cable.

CHANNEL AND CONTROL.—Gravel and sand; appears permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year: 14.6 feet at 7.30 a. m. February 2 (discharge, 33,900 second-feet); minimum stage recorded, 2.8 feet, August 13 to September 30 (discharge, 2,740 second-feet).

1910–1915: Maximum stage recorded, 18.2 feet, December 31, 1913 (discharge, computed from extension of rating curve, 47,000 [1] second-feet); minimum stage recorded, 2.8 feet, occurred for about a month in 1913, 1914, and 1915 (discharge, 2,740 second-feet).

DIVERSIONS.—A small amount of water for irrigation is diverted from the main stream and tributaries above the station.

ACCURACY.—Results excellent. Rating curve now used is applicable since the station was established and is defined by discharge measurements for all stages but the very highest.

The following discharge measurement was made by H. J. Tompkins:
September 3, 1915: Gage height, 2.80 feet; discharge, 2,830 second-feet.

[1] Figure published in Water-Supply Paper 391, p. 213, is in error.

Digitized by Google

Daily discharge, in second-feet, of Pit River near Ydalpom, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,880	3,030	3,180	3,330	26,600	10,100	10,500	5,820	5,280	3,480	3,030	2,740
2	2,880	3,030	3,480	3,330	30,300	9,390	11,000	5,460	5,110	3,480	3,030	2,740
3	2,880	3,030	4,100	3,480	19,600	8,330	11,200	5,110	5,110	3,480	3,030	2,740
4	2,880	3,030	4,600	3,480	16,900	7,920	10,300	4,940	4,940	3,330	3,030	2,740
5	2,880	3,030	4,430	3,940	9,390	7,520	9,830	4,940	4,770	3,330	3,030	2,740
6	2,880	3,030	3,940	5,280	7,920	6,550	9,390	4,770	4,600	3,330	3,030	2,740
7	2,880	3,030	3,780	6,550	7,320	6,360	8,750	4,770	4,600	3,330	3,030	2,740
8	2,880	3,030	3,630	11,000	9,390	6,180	8,120	4,600	4,430	3,330	3,030	2,740
9	2,880	3,030	3,480	9,170	13,200	6,000	7,920	9,170	4,430	3,330	2,880	2,740
10	3,180	3,030	3,330	4,940	10,100	6,000	7,520	12,400	4,260	3,330	2,880	2,740
11	3,180	3,030	3,330	4,100	8,540	5,820	7,320	14,500	4,260	3,330	2,880	2,740
12	3,030	3,180	3,330	4,600	7,920	6,550	7,120	13,900	4,260	3,330	2,880	2,740
13	3,030	3,180	3,330	6,000	7,520	7,120	6,930	11,200	4,100	3,330	2,740	2,740
14	3,030	3,180	3,330	6,740	7,320	7,320	6,930	10,300	4,100	3,330	2,740	2,740
15	3,030	3,180	3,330	6,360	7,720	7,520	6,740	9,390	3,940	3,180	2,740	2,740
16	3,030	3,180	3,330	5,640	9,390	7,320	6,550	8,330	3,940	3,180	2,740	2,740
17	3,180	3,180	3,330	4,600	15,500	7,320	6,360	8,330	3,940	3,180	2,740	2,740
18	3,180	3,180	3,330	3,940	16,600	7,320	6,360	8,120	3,940	3,180	2,740	2,740
19	3,180	3,180	3,330	3,940	12,400	7,320	6,360	8,120	3,940	3,180	2,740	2,740
20	3,940	3,180	3,330	3,940	11,500	7,320	6,180	7,920	3,780	3,030	2,740	2,740
21	3,330	3,180	3,330	3,780	9,610	7,520	6,180	7,920	3,780	3,030	2,740	2,740
22	3,180	3,180	3,330	3,780	10,500	7,120	6,000	7,720	3,630	3,030	2,740	2,740
23	3,180	3,180	3,330	3,630	14,200	7,120	6,000	7,520	3,630	3,030	2,740	2,740
24	3,030	3,180	3,330	3,630	13,200	6,930	6,000	7,320	3,630	3,030	2,740	2,740
25	3,030	3,180	3,480	3,630	11,900	6,930	6,000	7,120	3,630	3,030	2,740	2,740
26	3,030	3,180	3,480	4,260	11,700	7,320	6,000	6,740	3,630	3,030	2,740	2,740
27	3,030	3,180	3,330	5,280	11,000	8,750	6,000	6,740	3,630	3,030	2,740	2,740
28	3,030	3,180	3,330	6,000	10,500	11,700	6,000	6,360	3,630	3,030	2,740	2,740
29	3,030	3,180	3,330	7,520	.....	13,200	6,000	6,000	3,630	3,030	2,740	2,740
30	3,030	3,180	3,180	10,100	.....	12,200	5,820	5,820	3,480	3,030	2,740	2,740
31	3,030	.....	3,180	11,900	.....	11,200	.....	5,640	.....	3,030	2,740	.....

NOTE.—Discharge determined from a well-defined rating curve.

Monthly discharge of Pit River near Ydalpom, Cal., for the year ending Sept. 30, 1915.

[Drainage area, 5,260 square miles.]

Month.	Discarge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	3,940	2,880	3,060	0.582	0.67	188,000	A.
November	3,180	3,030	3,120	.593	.66	186,000	A.
December	4,600	3,180	3,480	.662	.76	214,000	A.
January	11,900	3,330	5,420	1.03	1.19	333,000	A.
February	30,300	7,320	12,400	2.36	2.46	689,000	A.
March	13,200	5,820	7,910	1.50	1.73	486,000	A.
April	11,200	5,820	7,380	1.40	1.56	439,000	A.
May	14,500	4,600	7,640	1.45	1.67	470,000	A.
June	5,280	3,480	4,130	.785	.88	246,000	A.
July	3,480	3,030	3,200	.608	.70	197,000	A.
August	3,030	2,740	2,830	.538	.62	174,000	A.
September	2,740	2,740	2,740	.521	.58	163,000	A.
The year	30,300	2,740	5,230	.994	13.48	3,780,000	

HAT CREEK AT HAT CREEK, CAL.

LOCATION.—In the SE. ¼ sec. 10, T. 34 N., R. 4 E., at private highway bridge on Morris ranch, in Lassen National Forest, 1 mile north of Hat Creek post office, Shasta County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 22, 1910, to September 30, 1915.

Digitized by Google

GAGE.—Vertical staff fastened to downstream end of right abutment of bridge; read occasionally by Fred Seaborn. This gage was carried out by the mud flow from Lassen volcano in May, 1915. A new gage at a new datum was installed at the same location July 25, 1915.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Rough; composed of gravel and small boulders; shift seldom.

EXTREMES OF STAGE.—Maximum stage recorded during year, 2.95 feet at 3.55 p. m. May 17; minimum stage recorded is of no value due to change in datum.

1910–1915: Maximum stage recorded, 2.95 feet at 3.55 p. m. May 17, 1915; minimum stage recorded, 1.73 feet September 11, 1913 (discharge, 24 second-feet).

WINTER FLOW.—No information.

DIVERSIONS.—On account of the diversions for irrigation above the station this record does not show the natural run-off from the drainage basin. On May 13, 1911, nine ditches were diverting a total of 110 second-feet. Of this amount, it was estimated that 55 second-feet was returned to the stream above the gage.

REGULATION.—No information.

ACCURACY.—The rating of the old gage was not checked after September, 1913. Only two measurements have been secured for the new gage and these indicate a shift between them. Weeds grow in the channel during the summer months and affect the rating. For these reasons no estimates of discharge for the year have been attempted.

COOPERATION.—Gage-height record furnished by United States Forest Service.

The following measurement was made by H. J. Tompkins:

July 25, 1915: Gage height, 1.32 feet; discharge, 115 second-feet.

Daily gage height, in feet, of Hat Creek at Hat Creek, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	July.	Aug.	Sept.
1						2.55				1.3	
2				2.6							
3		2.65	2.6					2.7			
4											
5											
6						2.5		2.6			
7											
8											
9			2.6								1.45
10											
11											
12											
13	2.65										1.4
14	2.7										
15								2.8			
16											
17								2.95			
18							2.9				
19			2.6								
20					2.55	2.6					
21											
22											
23											1.4
24						2.55					
25					2.55				1.3		
26					2.5						
27							2.65				
28					2.55						
29											
30		2.55									
31											

NOTE.—New gage and datum beginning July 25, 1915.

Digitized by Google

KOSK CREEK NEAR HENDERSON, CAL.

LOCATION.—In sec. 12, T. 37 N., R. 1 W., above bridge on Holm ranch, in Shasta National Forest, 3½ miles above the mouth of the creek, and 4 miles north of Henderson, Shasta County. Baker Creek enters about one-fourth mile below the station.

DRAINAGE AREA.—51.9 square miles.

RECORDS AVAILABLE.—October 1, 1910, to September 30, 1915 (not complete).

GAGE.—Vertical staff fastened to an alder tree on left bank 100 feet above bridge; read once a day, occasionally, by P. D. Lofton.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and period 1910–1915, 8.0 feet at 9 a. m. May 11, 1915 (discharge, 2,920 second-feet, determined from extension of rating curve and may be subject to error); minimum stage recorded, 2.78 feet at 7 a. m. December 21 and at 2 p. m. December 25, 1914 (discharge, 19 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Determinations of discharge for days on which gage was read are good; discharge for other days subject to error.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurement of Kosk Creek near Henderson, Cal., during the year ending Sept. 30, 1915.

[Made by H. J. Tompkins.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 21	3.10	52
Apr. 17	5.35	726

Digitized by Google

Daily discharge, in second-feet, of Kosk Creek near Henderson, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	30	32	a 24	64	1,080	370	1,490	a 411	a 433	a 110	62	a 47
2	32	a 32	24	a 62	2,500	350	1,200	331	390	a 110	a 62	a 47
3	32	a 32	a 24	a 60	785	331	1,420	a 322	331	110	a 61	46
4	32	a 32	a 23	a 58	a 733	312	a 1,300	312	331	110	a 61	a 42
5	a 32	a 32	a 23	56	a 681	312	a 1,190	a 312	312	110	a 61	a 39
6	a 32	a 32	a 22	a 100	a 629	a 306	a 1,070	312	a 303	110	a 60	36
7	32	32	22	a 200	a 578	a 300	959	295	a 295	a 107	60	a 36
8	a 40	a 31	a 22	a 250	a 527	a 294	843	a 278	a 286	a 104	a 60	a 36
9	48	a 30	a 22	a 100	476	a 288	785	2,600	278	a 102	a 59	a 36
10	56	29	22	51	a 447	a 283	a 800	2,300	a 249	100	a 59	a 36
11	a 52	a 29	a 22	a 50	a 418	278	814	2,920	220	94	a 59	36
12	a 48	a 29	a 21	a 50	a 390	a 400	901	1,420	194	a 92	a 58	a 36
13	a 45	a 28	21	a 49	a 362	523	a 843	1,340	a 194	a 90	a 58	a 36
14	a 42	a 28	a 21	a 48	a 334	a 530	785	a 1,190	a 194	a 88	a 58	a 36
15	a 39	28	a 21	48	a 306	a 537	729	a 1,050	a 194	86	a 57	a 36
16	36	a 28	a 20	a 48	278	a 544	729	901	194	a 86	a 57	36
17	138	a 27	a 20	48	1,490	a 551	785	1,080	a 182	86	a 57	a 36
18	a 124	a 26	20	a 48	1,490	a 558	a 814	959	170	a 84	a 56	36
19	110	26	a 20	a 49	1,140	a 565	843	843	a 164	a 83	56	a 36
20	56	a 26	a 19	a 50	675	572	a 788	a 805	159	a 82	a 56	a 36
21	46	a 26	19	a 51	623	623	a 733	a 767	148	80	a 55	36
22	a 43	a 25	a 19	51	523	a 733	a 678	729	128	a 74	a 55	a 36
23	a 40	a 25	a 19	a 51	476	843	623	623	a 128	67	a 54	a 36
24	a 38	25	a 19	a 50	548	814	a 573	a 676	a 128	a 67	54	a 36
25	36	a 25	19	a 49	572	843	523	729	a 128	a 67	a 54	36
26	a 36	a 25	a 19	48	476	901	a 523	675	128	a 67	a 53	a 36
27	36	25	a 20	a 102	432	843	a 523	a 624	a 122	a 67	a 52	a 36
28	a 34	a 25	20	155	390	1,490	523	a 573	a 116	a 67	a 51	a 36
29	a 33	a 24	a 20	184	.....	1,570	572	523	110	67	a 50	a 36
30	32	24	a 20	220	.....	1,490	a 491	523	a 110	a 66	a 49	36
31	a 32	.....	20	454	.....	1,340	.....	476	.....	65	48	.....

a Estimated.

NOTE.—Discharge for days on which gage was read determined from a rating curve fairly well defined below 1,000 second-feet.

Monthly discharge of Kosk Creek near Henderson, Cal., for the year ending Sept. 30, 1915.

[Drainage area, 51.9 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	138	30	47.2	0.909	1.05	2,900
November	32	24	27.9	.538	.60	1,660
December	24	19	20.9	.403	.46	1,290
January	454	48	93.7	1.81	2.09	5,760
February	2,500	278	691	13.3	13.85	38,400
March	1,570	278	635	12.2	14.07	39,000
April	1,490	491	828	16.0	17.85	49,300
May	2,920	278	868	16.7	19.25	53,400
June	433	110	211	4.07	4.54	12,600
July	110	65	87.0	1.68	1.94	5,350
August	62	48	56.5	1.09	1.26	3,470
September	47	36	37.4	.721	.80	2,230
The year	2,920	19	297	5.72	77.76	215,000

Digitized by Google

McCLOUD RIVER AT BAIRD, CAL.

LOCATION.—In the NW. ¼ sec. 23, T. 34 N., R. 4 W., at United States fishery at Baird, Shasta County, about 2 miles above junction with Pit River. Bailey Creek enters about 2,000 feet above and John Creek 2,000 feet below the station.

DRAINAGE AREA.—665 square miles.

RECORDS AVAILABLE.—December 22, 1910, to September 30, 1915.

GAGE.—Vertical staff fastened to an alder tree on right bank, 600 feet above the hatchery; read once a day by G. H. Lambson.

DISCHARGE MEASUREMENTS.—Made from car and cable 20 feet upstream from gage.

CHANNEL AND CONTROL.—Composed of gravel and cobblestones; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.2 feet at noon February 2 (discharge, 27,300 second-feet); minimum stage recorded, 1.89 feet at noon December 31 (discharge, 1,200 second-feet).

1910–1915: Maximum stage recorded, 14.2 feet at noon February 2, 1915 (discharge, 27,300 second-feet); minimum stage recorded, October 17, 1910, a miscellaneous measurement, stage not referenced (discharge, 1,100 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Results excellent.

COOPERATION.—Gage-height record furnished by G. H. Lambson, superintendent of the United States fishery.

The following discharge measurement was made by H. J. Tompkins:
September 2, 1915: Gage height, 2.18 feet; discharge, 1,530 second-feet.

Daily discharge, in second-feet, of McCloud River at Baird, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,300	1,480	1,250	1,200	12,500	3,860	7,560	3,340	3,340	1,880	1,640	1,500
2	1,300	1,420	1,360	1,200	27,300	3,470	6,590	3,220	3,220	1,880	1,640	1,500
3	1,360	1,300	1,420	1,250	11,300	3,340	6,590	2,860	3,100	1,880	1,640	1,500
4	1,300	1,300	1,540	1,250	6,780	3,220	5,890	2,750	2,980	1,880	1,640	1,500
5	1,300	1,300	1,600	1,300	5,570	3,100	5,410	2,750	2,980	1,880	1,560	1,500
6	1,300	1,300	1,540	1,740	4,820	2,980	4,960	2,750	2,860	1,880	1,560	1,500
7	1,300	1,300	1,360	2,500	3,600	2,860	5,110	2,640	2,860	1,880	1,560	1,500
8	1,360	1,300	1,420	3,910	6,060	2,750	4,960	2,750	2,750	1,880	1,560	1,500
9	1,360	1,300	1,480	3,280	6,780	2,750	4,680	8,380	2,750	1,880	1,560	1,500
10	1,360	1,250	1,420	1,810	6,060	2,640	4,540	15,600	2,640	1,880	1,560	1,500
11	1,300	1,250	1,360	1,880	4,540	2,640	4,540	14,000	2,530	1,800	1,560	1,500
12	1,300	1,250	1,300	1,600	3,220	2,860	4,540	10,600	2,420	1,800	1,560	1,500
13	1,300	1,300	1,300	1,250	3,220	3,470	4,540	7,960	2,320	1,800	1,560	1,500
14	1,300	1,250	1,250	2,040	3,220	3,470	4,400	6,410	2,320	1,800	1,560	1,500
15	1,300	1,250	1,250	1,810	3,220	3,470	4,260	4,820	2,230	1,800	1,560	1,500
16	1,300	1,250	1,250	1,600	4,120	3,860	4,120	4,680	2,230	1,800	1,560	1,500
17	1,600	1,250	1,250	1,540	12,500	3,730	4,260	5,730	2,230	1,800	1,500	1,420
18	1,420	1,250	1,250	1,480	10,100	3,730	4,260	6,410	2,140	1,800	1,500	1,420
19	1,480	1,250	1,250	1,480	7,560	3,600	4,260	5,570	2,140	1,800	1,500	1,420
20	1,420	1,250	1,250	1,420	6,060	3,470	4,260	4,820	2,140	1,720	1,500	1,420
21	1,360	1,250	1,200	1,420	5,110	3,470	4,260	4,540	2,040	1,720	1,500	1,420
22	1,360	1,250	1,200	1,360	5,110	3,730	3,990	4,260	2,040	1,720	1,500	1,420
23	1,360	1,250	1,200	1,360	5,730	3,860	3,860	3,990	2,040	1,720	1,500	1,420
24	1,300	1,250	1,200	1,360	7,360	3,860	3,730	4,820	2,040	1,720	1,500	1,420
25	1,300	1,250	1,200	1,360	6,410	3,990	3,600	4,820	1,960	1,720	1,500	1,420
26	1,300	1,250	1,250	1,360	5,260	4,400	3,600	4,400	1,960	1,720	1,500	1,420
27	1,300	1,250	1,200	1,600	4,540	4,540	3,470	4,260	1,960	1,720	1,500	1,420
28	1,300	1,300	1,200	2,600	4,260	11,300	3,600	3,990	1,960	1,720	1,500	1,420
29	1,300	1,300	1,200	2,930	.....	12,500	3,730	3,860	1,960	1,640	1,500	1,420
30	1,300	1,250	1,200	5,430	.....	11,000	3,600	3,600	1,960	1,640	1,500	1,420
31	1,300	.....	1,200	6,320	.....	8,800	.....	3,470	.....	1,640	1,500	.....

NOTE.—Discharge determined from two rating curves as follows: Oct. 1 to Feb. 2, well-defined below 17,000 second-feet; Feb. 3 to Sept. 30, well-defined.

Digitized by Google

Monthly discharge of McCloud River at Baird, Cal., for the year ending Sept. 30, 1915.

[Drainage area, 665 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	1,600	1,300	1,340	2.02	2.33	82,400	A.
November	1,480	1,250	1,280	1.92	2.14	76,200	A.
December	1,600	1,200	1,300	1.95	2.25	79,900	A.
January	6,320	1,200	2,020	3.04	3.51	124,000	A.
February	27,300	3,220	6,870	10.3	10.73	382,000	A.
March	12,500	2,640	4,410	6.63	7.64	271,000	A.
April	7,560	3,470	4,570	6.87	7.67	272,000	A.
May	15,600	2,640	5,290	7.95	9.17	325,000	A.
June	3,340	1,960	2,400	3.61	4.03	143,000	A.
July	1,880	1,640	1,790	2.69	3.10	110,000	A.
August	1,640	1,500	1,540	2.32	2.68	94,700	A.
September	1,500	1,420	1,460	2.20	2.45	86,900	A.
The year	27,300	1,200	2,830	4.26	57.70	2,050,000	

DEER CREEK NEAR VINA, CAL.

LOCATION.—In the NW. ¼ sec. 23, T. 25 N., R. 1 W., 2½ miles northeast of Roberts ranch house, about 9½ miles northeast of Vina, Tehama County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 17, 1911, to December 31, 1915, when the station was discontinued.

GAGE.—Vertical staff fastened to a sycamore tree on left bank, one-fourth mile above location of old sheep bridge; read once a day by David Roberts.

DISCHARGE MEASUREMENTS.—Made from car and cable 100 feet below gage or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; shifts during extremely high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.5 feet at 10 a. m. February 2 (discharge, 5,480 second-feet); minimum stage recorded, 1.93 feet at 8.30 a. m. September 30 (discharge, 104 second-feet).

1911–1915: Maximum stage recorded, 11.0 feet at 3.30 p. m. December 31, 1913 (discharge, 6,920 second-feet); minimum stage recorded, 2.02 feet during most of September and October, 1913 (discharge, 92 second-feet).

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Results excellent October to January. From February on there is some doubt about the applicability of the rating curve.

Discharge measurements of Deer Creek near Vina, Cal., during 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 19	H. J. Tompkins	2.35	170	Feb. 11	Charles Leidl	4.14	914
Feb. 6	Charles Leidl	3.33	515	Nov. 21	.....do	2.04	131
6	.....do	3.33	518				

Digitized by Google

Daily discharge, in second-feet, of Deer Creek near Vina, Cal., for the period Oct. 1, 1914, to Dec. 31, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914-15.												
1	a 112	125	125	128	2,350	690	950	690	a 608	185	a 126	a 109
2	112	150	128	128	5,480	595	840	595	a 577	a 178	a 124	a 108
3	112	a 134	168	202	1,730	528	a 895	550	a 545	172	a 123	a 107
4	a 112	118	255	178	1,070	482	950	a 528	a 514	a 168	a 122	a 107
5	a 113	118	185	165	690	440	740	505	482	165	121	106
6	a 113	a 117	150	490	550	420	740	482	460	a 164	a 119	a 106
7	113	116	168	255	440	380	740	482	a 453	a 163	117	a 106
8	a 117	116	141	1,660	1,380	370	740	a 896	a 447	a 162	117	a 106
9	a 120	116	133	482	2,030	340	690	1,310	440	a 161	a 117	a 106
10	124	a 116	255	240	1,310	340	740	2,350	400	160	a 116	a 106
11	125	115	360	210	950	322	740	2,350	a 380	a 157	a 116	106
12	a 120	a 116	192	420	640	322	840	2,510	350	a 153	a 115	a 106
13	115	a 117	a 164	305	528	322	840	1,950	340	150	115	a 107
14	a 114	118	135	595	440	360	740	1,590	a 323	a 148	a 115	a 108
15	113	116	133	322	400	420	790	1,310	a 305	145	115	108
16	115	115	133	255	3,210	460	840	1,130	288	a 143	a 115	a 107
17	125	a 115	168	210	2,350	505	950	1,590	288	141	a 114	a 107
18	145	115	141	210	1,590	505	950	1,590	a 272	a 140	a 114	106
19	125	a 115	a 148	172	1,190	528	950	a1,360	255	139	a 113	a 106
20	172	115	154	160	1,130	528	950	1,130	255	a 137	a 113	106
21	128	115	133	154	840	550	a 950	1,010	a 249	a 134	a 112	a 106
22	122	115	128	150	740	572	950	950	a 243	a 132	112	a 106
23	a 120	a 115	128	a 150	790	595	840	840	a 237	130	a 112	a 106
24	118	115	128	150	950	640	a 740	950	a 231	a 129	112	a 106
25	117	a 115	a 128	172	840	640	640	a 847	225	128	a 111	a 106
26	a 116	115	128	168	690	640	595	a 743	210	a 128	a 111	106
27	115	a 154	133	595	640	572	a 630	640	202	a 128	110	a 106
28	a 115	192	a 130	1,600	950	2,850	a 725	a 640	198	a 128	a 110	a 105
29	115	136	128	2,510	.....	1,950	790	640	a 192	a 127	a 110	a 104
30	117	128	a 128	1,310	.....	1,450	740	640	185	a 127	110	104
31	121	.....	128	840	.....	1,130	.....	640	.....	127	a 109	.....

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1915.				1915.				1915.			
1	.....	.....	.....	11	.....	.....	.....	21	.....	117	.....
2	.....	.....	.....	12	.....	112	.....	22	106	128	.....
3	106	106	.....	13	106	.....	1,800	23	.....	.....	160
4	.....	.....	550	14	.....	112	.....	24	.....	160	.....
5	106	.....	.....	15	.....	.....	.....	25	106	.....	.....
6	.....	106	270	16	.....	.....	.....	26	.....	.....	.....
7	.....	.....	.....	17	106	.....	.....	27	.....	150	.....
8	.....	.....	.....	18	.....	.....	210	28	.....	.....	141
9	.....	133	.....	19	.....	.....	.....	29	.....	.....	.....
10	.....	.....	240	20	.....	.....	.....	30	106	.....	.....
								31	.....	.....	138

a Interpolated.

NOTE.—Discharge determined from a well-defined rating curve, but its applicability after February, 1915, is somewhat doubtful. Discharge measurement on November 21, 1915, indicates that the rating curve used gives results which are about 12 per cent too small at a stage of 110 second-feet.

Digitized by Google

Monthly discharge of Deer Creek near Vina, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	172	112	120	7,380	A.
November	192	115	123	7,320	A.
December	360	125	157	9,650	A.
January	2,510	128	471	29,000	A.
February	5,480	400	1,280	71,100	B.
March	2,850	322	659	40,500	B.
April	950	595	808	48,100	B.
May	2,510	482	1,080	66,400	B.
une	608	185	339	20,200	B.
July	185	127	147	9,040	C.
August	126	109	115	7,070	C.
September	109	104	106	6,310	C.
The year	5,480	104	445	322,000	

STONY CREEK NEAR STONYFORD, CAL.

LOCATION.—In the E. ½ sec. 35, T. 18 N., R. 7 W., 3½ miles from Stonyford, Colusa County.

DRAINAGE AREA.—97 square miles.[1]

RECORDS AVAILABLE.—April 1 to December 31, 1913 (monthly estimates), and January 1 to December 31, 1914, when the station was discontinued.

GAGE.—Vertical staff fastened to rock; read by Eddie Laux.

DISCHARGE MEASUREMENTS.—Made from car and cable 50 feet below gage.

CHANNEL AND CONTROL.—Shallow gravel; fairly permanent.

EXTREMES OF DISCHARGE.—1913–14: Maximum mean daily discharge, 5,350 second-feet January 2, 1914; minimum mean daily discharge, 20 second-feet during parts of September and October ,1913.

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Maximum discharge computed from cross-section measurements and slope of water surface. Rating curve defined by current meter measurements below 5,000 second-feet.

COOPERATION.—Complete record furnished by United States Reclamation Service.

Daily discharge, in second-feet, of Stony Creek near Stonyford, Cal., for the period Oct. 1 to Dec. 31, 1914.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	30	32	36	11	31	32	57	21	35	29	37
2	30	32	36	12	31	32	55	22	33	29	37
3	30	32	37	13	31	32	45	23	32	29	52
4	30	32	51	14	31	31	37	24	32	28	47
5	30	32	42	15	32	30	36	25	32	28	45
6	30	32	37	16	32	28	35	26	32	28	43
7	30	32	35	17	32	32	35	27	32	27	47
8	31	32	35	18	32	31	82	28	32	175	44
9	32	32	55	19	34	31	57	29	32	55	43
10	32	32	57	20	45	29	52	30	32	37	43
								31	32		47

[1] Measured by U. S. Reclamation Service.

Digitized by Google

Monthly discharge of Stony Creek near Stonyford, Cal., for the period Oct. 1 to Dec, 31, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	45	30	32.0	1,970
November	175	27	36.4	2,170
December	82	35	45.1	2,770
The period				6,910

NOTE.—Monthly discharge computed by engineers of the U. S. Geological Survey.

LITTLE STONY CREEK NEAR LODOGA, CAL.

LOCATION.—At East Park reservoir, 4 miles above junction with Stony Creek and 3½ miles northwest of Lodoga, Colusa County.

DRAINAGE AREA.—102 square miles.

RECORDS AVAILABLE.—January 1, 1908, to September 30, 1915.

GAGE.—Beginning December 1, 1910, the record is from the gage at the dam. Previous to this date the station was maintained a short distance below the present site.

DISCHARGE.—Computed from gage heights observed at the dam. Correction has been made for evaporation, which is determined from records obtained from an evaporation pan at the reservoir. When the flow is 10 second-feet or less the discharge is computed from weir and current meter measurements taken at the head of the reservoir about 3 miles above the dam.

EXTREMES OF DISCHARGE.—1907–1915: Maximum stage reported, 11.8 feet February 2, 1909 (discharge, 7,060 second-feet); no flow during periods of every year.

DIVERSIONS.—No information.

REGULATION.—East Park reservoir is used for storage for the Orland project of the United States Reclamation Service.

ACCURACY.—Considerable care is used in collecting these data and results are good.

COOPERATION.—Daily discharge furnished by United States Reclamation Service, through A. N. Burch, project manager.

Digitized by Google

Daily discharge, in second-feet, of Little Stony Creek near Lodoga, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.5	0.9	0.1	5.0	1,120	256	331	84	48	22	2.0	1.0
2	.5	.9	.4	5.0	4,760	236	287	103	38	22	2.0	.0
3	.5	.9	.0	6.0	2,780	206	246	82	43	26	2.0	.0
4	1.0	.9	1.9	2.0	976	195	203	102	44	22	2.0	.0
5	1.0	.9	11	2.7	600	183	208	81	46	22	2.0	.0
6	1.0	.9	6.4	62	415	173	181	78	44	22	2.0	.0
7	1.0	.9	5.0	24	315	166	161	88	44	22	2.0	.0
8	1.0	1.4	2.3	247	1,240	166	161	88	44	22	2.0	.0
9	1.0	1.4	11	527	2,540	153	156	90	35	22	2.0	.0
10	1.0	1.4	33	311	903	155	148	127	42	22	1.7	.0
11	1.0	1.4	53	166	604	153	149	298	38	5.6	1.7	.0
12	1.0	1.4	37	31	405	156	91	159	31	5.6	1.7	.0
13	1.0	1.4	24	85	332	147	104	150	34	5.6	1.5	.0
14	1.0	1.4	14	292	269	153	151	120	34	5.6	1.5	.0
15	1.0	1.9	14	185	226	136	125	143	36	5.6	1.5	.0
16	1.0	1.9	14	122	723	131	126	155	28	5.6	1.5	.0
17	1.0	1.9	7.9	75	1,070	131	138	152	30	5.6	1.5	.0
18	1.4	1.9	76	64	553	128	111	128	14	4.0	1.5	.0
19	1.4	1.9	68	49	375	103	122	82	26	4.0	1.2	.0
20	1.4	1.9	17	39	346	146	114	115	24	4.0	1.2	.0
21	1.4	1.9	31	46	308	121	142	80	27	4.0	1.2	.0
22	1.4	1.9	14	40	469	96	126	96	22	4.0	1.2	.0
23	1.4	1.9	8.5	40	377	109	114	81	27	4.0	1.2	.0
24	1.4	1.9	5.5	36	548	101	126	72	33	4.0	1.2	.0
25	1.4	1.9	3.0	40	627	128	98	70	27	2.2	1.0	.0
26	1.4	1.9	5.5	28	424	126	114	67	16	2.2	1.0	.0
27	1.4	1.9	11	335	340	122	98	74	23	2.2	1.0	.0
28	1.4	1.9	14	1,570	405	1,740	104	49	20	2.2	1.0	.0
29	1.4	.9	9.5	2,160	.....	947	85	30	23	2.2	1.0	.0
30	1.4	.9	3.0	1,150	.....	530	94	61	22	2.2	1.0	.0
31	1.4	.....	5.0	614	.....	430	.....	58	.....	2.2	1.0	.....

Monthly discharge of Little Stony Creek near Lodoga, Cal., for the year ending Sept. 30, 1915.

[Drainage area, 102 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	1.4	0.5	1.13	0.011	0.01	69
November	1.9	.9	1.48	.015	.02	88
December	76	.0	16.3	.160	.18	1,000
January	2,160	2.0	270	2.65	3.06	16,600
February	4,760	226	859	8.42	8.77	47,700
March	1,740	96	249	2.44	2.81	15,300
April	331	85	147	1.44	1.61	8,750
May	298	30	102	1.00	1.15	6,270
June	48	14	32.1	.315	.35	1,910
July	22	2.2	9.89	.097	.11	608
August	2.0	1.0	1.49	.015	.02	92
September	1.0	.0	.03	.00029	.0003	2
The year	4,760	.0	136	1.33	18.09	98,400

NOTE.—Monthly and yearly discharge computed by engineers of the U. S. Geological Survey.

Digitized by Google

NORTH FORK OF FEATHER RIVER NEAR PRATTVILLE, CAL.

LOCATION.—In sec. 28, T. 27 N., R. 8 E., below the Great Western Power Co.'s dam at Big Meadows, 4 miles above mouth of Butt Creek and about 5 miles southeast of Prattville, Plumas County.

DRAINAGE AREA.—506 square miles above dam site.

RECORDS AVAILABLE.—June 13, 1905, to September 30, 1915.

GAGE.—Vertical staff in flume about 500 feet below the dam. Original gage was a Friez water-stage recorder located about on the south line of sec. 21 (above the dam). It was moved downstream about 1,300 feet April 29, 1912, and again about 2,200 feet downstream July 31, 1912. The Friez recorder was discontinued March 21, 1914, when the station was removed to present site. Original datum has not been maintained.

DISCHARGE MEASUREMENTS.—Made in flume at gage.

CHANNEL AND CONTROL.—No information.

EXTREMES OF DISCHARGE.—1905–1915: Maximum stage recorded, 16.2 feet, crest of flood, March 19, 1907 (discharge, 10,000 second-feet); no flow April 15 and 16, 1914 (water being stored).

DIVERSIONS.—No information.

REGULATION.—Since March 7, 1914, the record shows the amount of water released from Big Meadows reservoir. There was 163,000 acre-feet of water in reservoir September 30, 1914, and 141,000 acre-feet September 30, 1915.

COOPERATION.—Record of discharge and storage furnished by Great Western Power Co., through L. P. Cornell, engineer.

Daily discharge, in second-feet, of North Fork of Feather River near Prattville, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Sept.
1	1,130	1,320	1,350	1,350	800	1,060	350	1,900	2,800	1,050	984	1,190
2	1,130	1,320	1,320	1,350	800	1,060	350	1,900	2,820	990	1,020	1,190
3	1,130	1,320	1,320	1,350	800	1,040	323	1,900	2,700	990	1,020	1,190
4	1,130	1,320	1,320	1,350	800	1,030	266	1,900	2,680	918	1,000	1,190
5	1,140	1,320	1,320	1,350	800	1,030	206	1,900	2,720	850	1,050	1,200
6	1,110	1,320	1,300	1,350	800	1,030	135	1,900	2,700	1,140	1,060	1,230
7	1,120	1,320	1,460	1,350	800	1,030	154	1,900	2,700	937	1,060	1,230
8	1,110	1,320	1,750	1,350	800	1,030	234	1,900	2,680	937	1,070	1,230
9	1,110	1,320	1,750	1,350	800	1,030	350	1,950	2,640	900	1,070	1,230
10	1,110	1,320	1,720	1,350	888	1,030	350	2,090	2,610	862	1,100	1,230
11	1,110	1,350	1,740	1,200	1,000	1,030	350	2,150	2,580	850	1,110	1,230
12	1,110	1,320	1,750	1,000	1,000	798	350	2,200	2,540	777	1,110	1,230
13	1,110	1,320	1,750	1,000	1,000	500	350	2,250	2,500	1,020	1,110	1,320
14	1,110	1,320	1,740	1,000	1,000	500	350	1,900	2,440	1,020	1,110	1,330
15	1,110	1,320	1,760	1,000	1,000	500	350	720	2,370	1,020	1,110	1,330
16	1,110	1,300	1,750	1,000	1,000	500	350	1,450	2,280	1,020	1,110	1,330
17	1,110	1,350	1,750	1,000	1,000	500	350	2,200	1,630	1,020	1,110	1,330
18	1,320	1,320	1,750	1,000	1,000	500	350	2,250	1,400	1,020	1,110	1,330
19	1,320	1,320	1,750	1,000	1,000	385	350	2,250	1,260	1,020	1,110	1,330
20	1,320	1,320	1,750	1,000	1,000	350	350	3,200	1,220	1,020	1,120	1,330
21	1,320	1,350	1,750	1,000	1,000	350	350	3,000	1,220	1,020	1,130	1,330
22	1,320	1,320	1,750	911	1,000	350	350	3,000	1,220	1,040	1,150	1,330
23	1,320	1,320	1,750	786	1,000	350	350	2,680	1,200	1,080	1,140	1,330
24	1,320	1,320	1,750	1,000	1,160	350	350	2,500	1,020	925	1,140	1,330
25	1,320	1,350	1,750	1,000	1,320	350	350	2,500	921	1,090	1,140	1,330
26	1,320	1,350	1,750	1,000	1,080	350	433	2,500	1,040	1,100	1,140	1,330
27	1,320	1,320	1,750	1,000	1,060	350	750	2,500	1,080	963	1,140	1,330
28	1,320	1,320	1,750	925	1,060	350	1,160	2,520	1,200	933	1,140	1,330
29	1,320	1,300	1,750	800	.....	350	1,500	2,600	1,200	993	1,140	1,330
30	1,320	1,350	1,680	800	.....	350	1,670	2,760	1,120	988	1,180	1,330
31	1,320	.....	1,380	800	.....	350	.....	2,760	.....	988	1,190	.....

Digitized by Google

Monthly discharge of North Fork of Feather River near Prattville, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.				Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	Mean [a] stored in reservoir.	
October	1,320	1,110	1,210	− 460	74,400
November	1,350	1,300	1,320	− 635	78,600
December	1,760	1,300	1,640	− 811	101,000
January	1,350	786	1,090	− 278	67,000
February	1,320	800	956	+ 26	53,100
March	1,060	350	638	+ 799	39,200
April	1,670	135	449	+1,840	25,700
May	3,200	720	2,230	+ 836	137,000
June	2,820	921	1,950	− 273	116,000
July	1,140	777	983	− 285	60,400
August	1,190	984	1,100	− 481	67,600
September	1,330	1,190	1,280	− 599	76,200
The year	3,200	135	1,240	.....	897,000

[a] The discharge in this column added to that in the column of "Means" gives the estimated unregulated discharge.

NOTE.—Monthly and yearly discharge, except monthly "Mean stored in reservoir," computed by engineers of the United States Geological Survey.

NORTH FORK OF FEATHER RIVER AT BIG BAR, CAL.

LOCATION.—In the NW. ¼ sec. 32, T. 23 N., R. 5 E., one-fourth mile above Big Bar station on Western Pacific Railroad, Butte County, and about 7 miles above intake of Great Western Power Co.'s power plant at Big Bend.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 24, 1911, to September 30, 1915.

GAGE.—Bristol water-stage recorder. Original gage was a staff installed July, 1910, opposite the middle of Jesse Moore Bar. January 17, 1911, station was moved 300 feet upstream and the Bristol water-stage recorder was installed; gage datum, 1,347.96 feet above sea level (U. S. Geological Survey datum). In November, 1912, the Bristol gage was moved upstream 130 feet; datum of present gage, 1,348.96 feet above sea level.

DISCHARGE MEASUREMENTS.—Made from car and cable 20 feet upstream from gage.

CHANNEL AND CONTROL.—Solid rock, boulders, and gravel; practically permanent.

EXTREMES OF DISCHARGE:—1911–1915; Maximum mean daily discharge, 35,000 second-feet January 1, 1914; minimum mean daily discharge, 836 second-feet October 18, 1913.

DIVERSIONS.—No information.

REGULATION.—Flow partly regulated by Big Meadows reservoir (Lake Almanor).

COOPERATION.—Record furnished by Great Western Power Co., through L. P. Cornell, engineer.

Digitized by Google

Daily discharge, in second-feet, of North Fork of Feather River at Big Bar, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,500	2,020	2,060	1,960	8,860	3,520	5,220	5,650	7,370	2,200	1,590	1,460
2	1,500	2,020	2,120	1,930	14,600	3,300	5,360	5,170	6,950	2,080	1,680	1,440
3	1,520	1,990	2,190	1,990	8,250	3,150	6,050	4,790	6,550	2,050	1,650	1,450
4	1,530	1,900	2,210	2,060	5,100	3,040	6,300	4,750	6,220	2,300	1,590	1,430
5	1,580	1,900	2,120	2,090	3,930	2,950	5,450	4,750	6,460	2,170	1,560	1,440
6	1,570	1,870	2,020	2,190	3,340	2,920	4,870	4,860	6,460	2,280	1,520	1,460
7	1,530	1,890	2,090	2,190	3,050	2,910	4,650	5,000	6,540	2,160	1,520	1,450
8	1,540	1,900	2,420	2,280	4,030	2,890	4,600	5,280	6,410	2,100	1,520	1,490
9	1,550	1,900	2,350	2,220	5,990	2,850	4,540	11,200	5,940	1,980	1,520	1,430
10	1,600	1,900	2,420	2,090	4,710	2,850	4,830	19,900	5,590	1,900	1,510	1,440
11	1,550	1,900	2,380	2,130	3,750	2,810	5,270	28,500	5,190	1,840	1,530	1,450
12	1,560	1,900	2,350	1,900	3,110	2,740	5,680	29,800	4,940	1,910	1,490	1,460
13	1,550	1,900	2,420	2,030	2,850	2,420	5,800	23,400	4,770	2,220	1,500	1,500
14	1,520	1,900	2,350	2,550	2,780	2,740	5,270	15,200	4,680	2,140	1,500	1,560
15	1,500	1,900	2,280	2,280	2,640	3,080	5,090	10,700	4,610	2,080	1,500	1,580
16	1,500	1,900	2,350	2,020	4,400	3,300	5,420	9,720	4,380	2,080	1,530	1,620
17	1,740	1,900	2,320	1,900	8,960	3,440	5,880	12,800	3,800	2,060	1,540	1,570
18	1,680	1,900	2,250	1,900	8,020	3,620	6,300	11,400	3,370	2,030	1,500	1,500
19	1,890	1,900	2,220	1,870	5,780	3,680	6,490	9,540	3,200	2,000	1,470	1,550
20	1,990	1,870	2,280	1,840	5,090	3,620	6,250	8,480	2,900	1,980	1,490	1,580
21	1,970	1,870	2,220	1,780	4,380	3,800	5,700	8,180	3,020	1,970	1,490	1,560
22	1,830	1,900	2,280	1,750	3,840	4,020	5,200	7,700	2,980	1,920	1,460	1,530
23	1,810	1,900	2,280	1,420	3,660	4,330	4,720	7,360	2,890	1,920	1,490	1,520
24	1,910	1,900	2,220	1,600	3,640	4,710	4,320	7,290	2,680	1,840	1,510	1,530
25	1,890	1,900	2,220	1,810	3,780	4,740	4,110	6,660	2,400	1,850	1,500	1,530
26	1,890	1,870	2,210	1,810	3,340	4,820	3,970	6,860	2,410	1,910	1,470	1,520
27	1,890	1,960	2,190	2,090	3,390	5,040	4,630	7,320	2,410	1,850	1,430	1,530
28	1,870	2,190	2,210	2,700	3,600	8,970	5,410	7,480	2,440	1,730	1,430	1,560
29	1,880	2,120	2,220	2,790	.....	8,960	6,420	7,230	2,440	1,640	1,450	1,580
30	1,900	2,090	2,210	3,080	.....	6,880	6,160	7,110	2,420	1,640	1,440	1,530
31	1,900	.....	2,150	3,150	.....	5,620	.....	7,220	.....	1,640	1,500	.....

NOTE.—No record Oct. 19 to 24. Discharge estimated by U. S. Geological Survey from interpolated values of the sum of the discharge at the station and the water released from Big Meadows reservoir. Company furnished a resord of water released covering this period.

Monthly discharge of North Fork of Feather River at Big Bar, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	1,990	1,500	1,700	105,000
November	2,190	1,870	1,930	115,000
December	2,420	2,020	2,250	138,000
January	3,150	1,420	2,110	130,000
February	14,600	2,640	4,960	275,000
March	8,970	2,420	3,990	245,000
April	6,490	3,970	5,330	317,000
May	29,800	4,750	10,000	615,000
June	7,370	2,400	4,410	262,000
July	2,300	1,640	1,980	122,000
August	1,680	1,430	1,510	92,800
September	1,620	1,430	1,510	89,900
The year	29,800	1,420	3,470	2,510,000

NOTE.—Monthly and yearly discharge computed by engineers of the U. S. Geological Survey. For amount of regulation at Big Meadows reservoir, see monthly-discharge table for station near Prattville, page 238.

FEATHER RIVER AT OROVILLE, CAL.

LOCATION.—In sec. 8, T. 19 N., R. 4 E., at highway bridge at Oroville, Butte County, 6 miles below junction of North and Middle forks, and 30 miles above the mouth of Yuba River.

DRAINAGE AREA.—3,640 square miles.

RECORDS AVAILABLE.—January 1, 1902 to September 30, 1915.

Digitized by Google

GAGE.—Friez water-stage recorder on right bank 200 feet below bridge, at same datum as United States Weather Bureau vertical staff which is in two sections on pier of highway bridge near right bank. Weather Bureau gage was used 1902 to 1905 with 2 feet added to the readings to reference them to the datum of the U. S. Geological Survey staff gage installed on left bank about 1,000 feet above the bridge in December, 1905. The latter gage was washed out several times and until repaired the Weather Bureau gage was used. December 16, 1912 the present water-stage recorder was put in operation.

DISCHARGE MEASUREMENTS.—Made from car and cable 1,000 feet above bridge. At extremely low water measurements have been made from a boat about 1,000 feet below the bridge.

CHANNEL AND CONTROL.—Composed of boulders and gravel; somewhat shifting during high water.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 16.3 feet at 2 p. m. May 11 (discharge, 112,000 second-feet); minimum stage from water-stage recorder, 0.88 foot at 8.30 a. m. September 7 (discharge, 1,410 second-feet).

1902–1915: Maximum stage recorded, 30.2 feet Weather Bureau gage; 39.3 feet on gage 1,000 feet upstream, March 19, 1907 (discharge 187,000 second-feet); minimum stage from water-stage recorder, −0.13 foot at 10 a. m. October 7, 1913 (discharge, 790 second-feet).

DIVERSIONS.—None.

REGULATION.—The operation of the Big Bend plant of the Great Western Power Co. causes diurnal fluctuation in stage, especially during extremely low water, when it amounts to about a foot. See also North Fork of Feather River near Prattville, Col.

ACCURACY.—Results excellent.

Daily discharge, in second-feet, of Feather River at Oroville, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,800	2,290	2,570	2,460	35,900	11,400	15,800	14,100	17,000	4,220	2,370	1,970
2	1,800	2,520	2,630	2,460	59,400	10,000	15,200	11,900	16,400	4,090	2,420	1,970
3	1,840	2,400	3,170	2,460	29,600	8,800	17,000	10,400	14,600	3,910	2,370	2,020
4	1,800	2,290	3,230	2,870	17,000	8,110	17,500	10,000	14,100	3,790	2,320	2,020
5	1,890	2,290	3,560	2,810	11,400	8,110	15,800	10,000	13,500	3,610	2,270	1,920
6	1,840	2,240	3,110	3,490	8,800	7,490	13,500	10,400	13,500	3,550	2,220	1,920
7	1,800	2,180	3,110	3,620	7,790	7,490	13,000	10,900	13,500	3,670	2,170	1,970
8	1,760	2,130	3,050	5,410	14,600	6,910	13,000	12,400	13,500	3,490	2,220	2,020
9	1,800	2,240	3,110	4,830	24,400	6,910	12,400	23,600	12,400	3,370	2,270	1,920
10	1,980	2,180	3,420	3,680	19,300	6,910	13,500	61,600	11,400	3,310	2,170	2,020
11	1,980	2,180	4,100	3,420	14,100	6,630	14,100	91,000	10,400	3,080	2,220	1,970
12	1,890	2,240	3,750	3,620	10,000	6,630	15,800	83,700	9,580	3,080	2,270	2,120
13	1,840	2,180	3,360	4,410	8,110	6,370	17,000	60,500	8,800	3,130	2,220	2,420
14	1,800	2,240	3,170	7,490	6,910	6,910	15,200	41,500	8,450	3,250	2,170	2,370
15	1,710	2,240	2,990	5,210	6,370	7,790	14,600	30,500	8,110	3,190	2,120	2,270
16	1,710	2,400	2,990	4,030	10,000	8,450	15,800	27,000	7,790	3,130	2,170	2,220
17	1,890	2,290	3,050	3,420	29,600	8,800	17,000	37,700	7,190	3,020	2,120	2,170
18	2,400	2,400	3,110	3,110	27,000	9,580	18,100	37,700	6,370	2,960	2,120	2,120
19	2,630	2,400	3,070	2,990	18,700	10,400	18,100	30,500	6,110	2,960	2,120	2,020
20	3,420	2,400	3,030	2,870	15,800	10,000	18,700	24,400	5,670	2,860	2,070	2,070
21	2,630	2,290	2,990	2,810	13,000	9,580	16,400	22,000	5,490	2,800	1,970	2,020
22	2,290	2,290	2,870	2,750	12,400	10,000	15,200	19,900	5,490	2,800	2,070	2,070
23	2,240	2,400	2,870	2,630	12,400	10,900	13,500	19,300	5,330	2,740	2,070	2,070
24	2,130	2,400	2,870	2,290	13,000	11,900	11,900	19,300	5,180	2,910	2,070	2,120
25	2,080	2,400	2,750	2,990	13,000	11,900	10,900	17,000	4,820	2,640	2,070	2,020
26	2,180	2,400	2,810	3,230	10,900	12,400	10,000	16,400	4,610	2,740	2,070	2,020
27	2,130	2,570	2,750	4,180	10,000	12,400	10,900	18,100	4,540	2,690	2,020	2,120
28	2,080	3,230	2,690	11,400	11,900	26,200	13,500	18,100	4,480	2,520	2,020	2,070
29	2,130	2,870	2,630	11,900	.....	30,500	17,000	18,100	4,480	2,470	1,970	2,270
30	2,240	2,690	2,630	10,900	.....	22,800	17,000	17,000	4,350	2,470	2,020	2,320
31	2,290	.....	2,630	11,900	.....	18,100	.....	17,000	.....	2,470	1,970	.....

NOTE.—Discharge determined from two well-defined rating curves, the change occurring May 11. Discharge Dec. 19 and 20 interpolated.

Digitized by Google

Monthly discharge of Feather River at Oroville, Cal., for the year ending Sept. 30, 1915.

[Drainage area, 3,640 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	3,420	1,710	2,060	0.566	0.65	127,000	A.
November	3,230	2,130	2,380	.654	.73	142,000	A.
December	4,100	2,570	3,030	.832	.96	186,000	A.
January	11,900	2,290	4,570	1.26	1.45	281,000	A.
February	59,400	6,370	16,800	4.62	4.81	933,000	A.
March	30,500	6,370	11,000	3.02	3.48	676,000	A.
April	18,700	10,000	14,900	4.09	4.56	887,000	A.
May	91,000	10,000	27,200	7.47	8.61	1,670,000	A.
June	17,000	4,350	8,900	2.45	2.73	530,000	A.
July	4,220	2,470	3,130	.860	.99	192,000	A.
August	2,420	1,970	2,150	.591	.68	132,000	A.
September	2,420	1,920	2,090	.574	.64	124,000	A.
The year	91,000	1,710	8,130	2.23	30.29	5,880,000	

BUTT CREEK AT BUTTE VALLEY, CAL.

LOCATION.—At lower end of Butte Valley, 100 feet below footbridge, 1,000 feet above intake to the Great Western Power Co.'s diversion flume, about one-fourth mile south of Butte Valley post office, Plumas County, and 2 miles above junction with North Fork of Feather River.

DRAINAGE AREA.—73 square miles at original station.

RECORDS AVAILABLE.—June 14, 1905, to September 30, 1915.

GAGE.—Vertical staff on left bank, installed July 19, 1912, seven-eighths of a mile upstream from original vertical staff, which was on right bank. This gage is out of the influence of the low-water diversion dam near the flume intake for the Great Western Power Co.'s Butt Creek plant.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Sand, gravel, and clay; appear permanent.

EXTREMES OF DISCHARGE.—1905–1915: Maximum mean daily discharge, 1,640 second-feet January 16, 1909; minimum mean daily discharge, 21 second-feet August 4 to 8, 1908.

DIVERSIONS.—Water is diverted from Butt Creek above the station into Yellow Creek watershed through Wallack ditch by the Oro Light & Power Co. The ditch has a capacity of from 15 to 20 second-feet.

REGULATION.—No information.

COOPERATION.—Record furnished by Great Western Power Co., through L. P. Cornell, engineer.

786°—18—WSP 411——16

Digitized by Google

Daily discharge, in second-feet, of Butt Creek at Butte Valley, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept
1	47	56	50	62	149	103	261	300	306	81	50	39
2	48	55	51	59	189	97	274	274	286	77	48	39
3	50	54	46	64	171	93	321	237	264	74	48	39
4	48	53	54	62	124	95	324	227	248	72	48	39
5	50	52	62	55	119	101	281	230	240	71	48	39
6	48	51	61	45	114	107	274	231	237	71	48	38
7	47	50	58	39	97	99	278	234	240	70	48	38
8	50	50	55	36	105	98	296	264	235	70	48	38
9	50	48	58	46	116	101	287	371	227	69	48	38
10	57	48	55	42	119	94	317	494	206	68	48	38
11	53	48	56	44	114	101	335	552	194	67	48	37
12	50	47	58	42	107	103	375	573	178	64	48	37
13	47	47	60	63	94	110	364	481	163	63	48	37
14	47	48	58	64	82	130	359	435	151	62	46	40
15	47	46	57	63	76	157	352	389	149	61	45	40
16	46	46	60	62	146	173	367	377	141	60	45	39
17	58	47	59	63	232	189	403	429	137	59	44	38
18	59	46	58	44	226	199	397	393	130	58	44	38
19	66	45	55	41	180	206	421	373	124	57	43	37
20	71	45	55	47	159	207	422	315	118	56	43	37
21	58	46	56	45	124	208	386	312	112	55	42	37
22	54	46	58	42	116	233	383	304	106	54	42	37
23	52	46	59	30	104	261	353	297	101	53	42	38
24	50	46	57	35	103	273	422	309	98	55	42	38
25	48	46	56	42	108	278	420	299	97	54	42	38
26	48	45	60	52	104	292	286	260	94	52	42	38
27	50	47	67	60	101	262	303	264	92	51	42	39
28	48	69	63	66	103	378	338	286	90	51	41	39
29	50	60	64	68	.....	416	399	312	86	50	40	39
30	55	53	60	67	.....	310	362	302	84	50	39	39
31	53	.....	62	63	.....	264	.....	299	.....	50	39	.....

Monthly discharge of Butt Creek at Butte Valley, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet:			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	71	46	51.8	3,190
November	69	45	49.5	2,950
December	67	46	57.7	3,550
January	68	30	52.0	3,200
February	232	76	128	7,110
March	416	93	185	11,400
April	422	261	345	20,500
May	573	227	336	20,700
June	306	84	164	9,780
July	81	50	61.4	3,780
August	50	39	44.8	2,750
September	40	37	38.2	2,270
The year	573	30	126	91,200

NOTE.—Monthly and yearly discharge computed by engineers of the U. S. Geological Survey.

INDIAN CREEK NEAR CRESCENT MILLS, CAL.

LOCATION.—In the SW. ¼ sec. 25, T. 26 N., R. 9 E., at the lower end of Indian Valley, about 2,000 feet below Arlington Bridge, and 1¼ miles below Crescent Mills, Plumas County. Spanish Creek enters 4 miles below the station.

DRAINAGE AREA.—740 square miles.

RECORDS AVAILABLE.—January 1, 1906, to December 31, 1909, and September 10, 1911, to September 30, 1915.

GAGE.—Vertical staff in three sections on right bank near observer's house, read once a day by Eugene Cook.

Digitized by Google

DISCHARGE MEASUREMENTS.—Made from car and cable, 30 feet below gage or by wading.

CHANNEL AND CONTROL.—Composed of gravel and small boulders; fairly permanent. At low stages water is deep and sluggish at gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.9 feet at 5 p. m. May 12 (discharge, 7,040 second-feet, computed from extension of rating curve and may be subject to error); minimum stage recorded, 0.98 foot, August 6 to 11 (discharge, 22 second-feet).

1906–1915: Maximum stage recorded, 20.2 feet at 6.30 a. m., crest of flood of March 19, 1907 (discharge, 11,700 second-feet, computed from extension of rating curve and may be subject to error); minimum stage recorded, 0.75 foot, August 9 to 15, 1908 (discharge, 12 second-feet).

DIVERSIONS.—Water is diverted from Indian Creek for irrigation in Indian and Genesee valleys.

REGULATION.—None.

ACCURACY.—Results good.

Discharge measurements of Indian Creek near Crescent Mills, Cal., during the year ending Sept. 30, 1915.

[Made by H. J. Tompkins.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Mar. 14	3.47	401	Aug. 12	0.98	25
31	5.64	1,680			

Daily discharge, in second-feet, of Indian Creek near Crescent Mills, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	50	96	108	120	865	645	1,720	995	805	126	40	29
2	56	96	108	120	2,130	560	1,800	865	750	120	36	29
3	61	96	108	126	1,490	484	2,130	865	695	114	31	29
4	61	96	114	133	930	450	2,130	865	600	110	27	29
5	63	96	120	146	560	450	1,880	865	560	108	23	31
6	66	96	123	152	450	418	1,490	865	520	106	22	34
7	66	96	126	159	360	388	1,340	865	484	102	22	36
8	66	96	130	166	865	388	1,270	865	450	102	22	37
9	72	96	130	172	1,490	388	1,200	930	450	102	22	40
10	72	96	133	172	995	388	1,200	1,800	388	102	22	43
11	72	96	133	179	695	388	1,340	4,040	334	96	22	45
12	72	96	133	186	520	388	1,420	7,030	310	90	23	43
13	72	96	126	200	450	388	1,560	6,010	278	84	23	40
14	72	96	120	216	388	450	1,340	4,140	250	78	23	37
15	72	94	120	208	334	560	1,130	3,050	232	72	25	36
16	72	94	120	200	334	695	1,130	2,040	224	66	25	34
17	72	90	120	186	865	750	1,270	2,300	216	61	25	31
18	78	86	120	172	1,640	865	1,340	1,960	200	59	25	29
19	78	86	120	159	1,130	865	1,420	1,800	186	59	27	29
20	84	84	120	159	750	865	1,340	1,490	179	56	27	29
21	84	84	120	152	695	930	1,340	1,340	172	56	27	29
22	84	84	120	146	600	1,960	1,200	1,200	166	56	27	29
23	84	84	120	140	600	1,200	1,060	1,060	159	52	27	29
24	84	84	120	133	520	1,490	865	995	152	52	27	29
25	84	84	120	146	520	1,640	865	930	146	50	29	29
26	84	84	120	152	520	1,800	865	865	146	50	29	31
27	84	96	120	172	520	1,560	865	865	146	48	29	31
28	84	120	120	200	600	1,880	865	865	140	48	29	31
29	84	114	120	268	.....	2,670	930	865	133	45	29	34
30	90	108	120	310	.....	1,960	1,200	865	133	42	29	34
31	96	.....	120	360	.....	1,640	.....	865	.....	42	29	.....

NOTE.—Discharge determined from a rating curve well defined between 100 and 4,000 second-feet.

Digitized by Google

Monthly discharge of Indian Creek near Crescent Mills, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	96	50	74.8	4,600	B.
November	120	84	94.0	5,590	B.
December	133	108	121	7,440	A.
January	360	120	178	10,900	A.
February	2,130	334	779	43,300	A.
March	2,670	388	923	56,800	B.
April	2,130	865	1,320	78,600	B.
May	7,030	865	1,750	108,000	B.
June	805	133	320	19,000	A.
July	126	42	75.9	4,670	B.
August	40	22	26.5	1,630	C.
September	45	29	33.2	1,980	C.
The year	7,030	22	472	343,000	

SPANISH CREEK AT KEDDIE, CAL.

LOCATION.—In the SW. ¼ sec. 22, T. 25 N., R. 9 E., at highway bridge at Keddie, Plumas County, 2 miles above junction with Indian Creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 22, 1911, to September 30, 1915.

GAGE.—Vertical staff in three sections, read once a day by C. O. Phillips. First section is on right bank 50 feet above bridge; second section on left bank 20 feet downstream from bridge; third section fastened to downstream side of left bridge pier. Previous to August 12, 1914, high-water section was painted on left abutment of bridge; low-water section was vertical staff fastened to a stump on left bank 20 feet below bridge.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Gravel; shifts during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.2 feet on morning of May 11 (discharge, 8,470 second-feet); minimum stage recorded, 1.2 feet September 1 to 10 (discharge, 33 second-feet).

1911–1915: Maximum stage recorded, 10.0 feet at 11 a. m. December 31, 1913, and at 1 p. m. January 2, 1914 (discharge, 9,450 second-feet, determined from extension of rating curve and may be subject to error); minimum stage recorded, 1.1 feet July 24 to 30, 1914 (discharge, 22 second-feet).

DIVERSIONS.—Water is diverted from Spanish Creek for irrigation in American Valley.

REGULATION.—None.

ACCURACY.—Results good.

Discharge measurements of Spanish Creek at Keddie, Cal., during the year ending Sept. 30, 1915.

[Made by H. J. Tompkins.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Mar. 14	3.10	431	Aug. 12	1.30	41
31	3.70	749			

Digitized by Google

Daily discharge, in second-feet, of Spanish Creek at Keddie, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	44	60	72	78	2,390	432	820	598	545	116	50	33
2	44	60	72	84	7,050	432	820	432	520	116	50	33
3	46	60	105	84	2,020	394	975	394	474	108	50	33
4	48	60	105	98	625	394	935	453	432	108	50	33
5	48	60	78	98	474	394	785	394	394	108	50	33
6	48	60	84	105	313	394	750	394	394	100	41	33
7	49	60	91	105	298	377	718	453	394	100	41	33
8	49	60	91	105	935	895	625	497	360	100	41	33
9	60	60	87	105	1,240	394	625	858	377	93	41	33
10	60	60	84	98	895	360	625	3,080	394	93	41	33
11	49	60	84	98	453	360	685	8,470	298	86	41	37
12	49	60	84	98	394	394	895	7,790	270	86	41	41
13	49	60	84	98	360	394	935	3,800	256	86	41	41
14	49	60	78	295	344	432	750	2,270	256	86	41	41
15	72	60	60	127	298	520	785	1,560	242	80	41	41
16	72	60	78	127	394	545	820	1,560	229	80	37	41
17	72	60	72	105	3,360	545	820	1,670	216	80	37	46
18	72	60	72	98	1,780	570	820	1,340	204	74	37	46
19	72	60	78	91	975	625	935	975	192	74	37	46
20	72	60	91	84	935	625	895	895	192	74	37	46
21	54	60	98	84	570	570	895	820	170	74	37	41
22	54	60	98	84	570	685	750	625	160	74	37	41
23	54	60	98	84	497	718	685	625	150	74	37	41
24	49	60	98	91	474	785	625	625	141	74	37	41
25	54	49	98	91	497	785	570	570	141	68	37	41
26	54	60	84	98	453	820	570	570	132	68	37	41
27	54	72	84	98	432	820	520	570	124	62	37	41
28	54	112	72	153	570	3,080	598	545	124	62	37	41
29	54	98	72	200	.....	1,780	625	570	116	50	37	41
30	72	84	72	245	.....	975	598	520	116	50	37	41
31	72	.....	78	258	.....	750	.....	520	.....	50	37	.....

NOTE.—Discharge determined from two rating curves as follows: Oct. 1 to Feb. 2, well defined below 2,000 second-feet; Feb. 3 to Sept. 30, well defined below 1,000 second-feet. Discharge July 16 interpolated.

Monthly discharge of Spanish Creek at Keddie, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	72	44	56.4	3,470	B.
November	112	49	63.8	3,800	B.
December	105	60	83.9	5,160	B.
January	295	78	118	7,260	B.
February	7,050	298	1,060	58,900	C.
March	3,080	360	685	42,100	B.
April	975	520	748	44,500	A.
May	8,470	394	1,430	87,900	C.
June	545	116	267	15,900	A.
July	116	50	82.4	5,070	B.
August	50	37	40.4	2,480	B.
September	46	33	38.9	2,310	B.
The year	8,470	33	385	279,000	

Digitized by Google

MIDDLE FORK OF FEATHER RIVER NEAR CROMBERG, CAL.

LOCATION.—Half a mile above Sloat station on Western Pacific Railroad, three-fourths mile above mouth of Poplar Creek, and about 1½ miles below Cromberg, Plumas County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 3, 1910, to September 30, 1915.

GAGE.—Gurley electric water-stage recorder on right bank installed December 5, 1913. Original gage located at California White Pine Co.'s log chute at Cromberg. Several changes in gage at that location were made. All were on downstream side of log chute piers and original datum maintained. New location has different datum. During construction of recorder well (Pl. VIII, A), November 9 to December 4, 1913, a staff gage was read at new location, new datum.

DISCHARGE MEASUREMENTS.—Made from car and cable 1 mile above gage, or by wading.

CHANNEL AND CONTROL.—Boulders and gravel, appear fairly permanent. Left bank, flat and timbered, will be submerged at flood stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 7.48 feet, May 12 (discharge, 5,570 second-feet); minimum stage, 2.57 feet at noon, August 31 (discharge, 48 second-feet).

1910–1915: Maximum stage recorded, 13.0 feet, April 7, 1911 (discharge, 9,640 second-feet); minimum stage recorded, 2.2 feet, September 17 to 29, 1913 (discharge, 44 second-feet).

WINTER FLOW.—Stage-discharge relation slightly affected by ice for very short periods.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Results good.

Discharge measurements of Middle Fork of Feather River near Cromberg, Cal., during the year ending Sept. 30, 1915.

[Made by H. J. Tompkins.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 14	[a] 3.52	214	Mar. 12	4.28	753	Mar. 30	5.00	1,440
15	3.00	131	13	4.52	953	Aug. 1	2.80	80

[a] Ice on control and at measuring section.

Digitized by Google

A. WELL AND SHELTER ON MIDDLE FORK OF FEATHER RIVER AT CROMBERG, CAL.

B. REINFORCED CONCRETE WELL AND GAGE HOUSE ON AMERICAN RIVER AT FAIROAKS, CAL.

Digitized by Google

Digitized by Google

Daily discharge, in second-feet, of Middle Fork of Feather River near Cromberg, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	63	87	85	95	420	732	1,190	739	930	226	74	51
2	63	83	87	102	894	683	1,180	690	858	214	72	51
3	68	75	102	108	410	634	1,410	697	746	203	70	52
4	66	72	110	130	290	662	1,450	725	718	189	68	52
5	66	72	110	120	258	718	1,310	792	704	172	66	52
6	66	70	98	122	274	718	1,080	760	704	166	64	52
7	66	69	102	110	302	746	1,160	768	732	166	62	52
8	68	69	85	100	354	753	1,120	753	732	157	61	53
9	70	70	89	87	620	760	1,120	1,330	676	151	60	53
10	79	95	98	87	490	784	1,160	2,850	620	145	59	52
11	72	81	91	85	380	800	1,230	4,750	532	142	58	52
12	69	77	87	87	318	792	1,390	4,340	466	140	58	52
13	68	77	83	100	274	957	1,360	2,850	420	135	58	53
14	68	81	85	214	258	1,190	1,060	2,320	415	125	57	57
15	68	79	79	120	266	1,390	1,100	2,180	420	118	56	56
16	68	79	93	95	380	1,480	1,220	1,960	395	112	57	55
17	79	79	91	102	876	1,480	1,250	1,780	380	108	56	54
18	85	79	87	87	768	1,500	1,250	1,560	370	100	56	54
19	105	77	91	87	697	1,430	1,260	1,430	350	98	55	53
20	110	75	87	83	697	1,360	1,220	1,240	330	95	55	53
21	87	75	81	83	676	1,310	1,060	1,110	314	91	54	53
22	79	75	85	79	655	1,240	984	1,070	298	105	53	53
23	75	75	87	72	613	1,230	894	1,030	298	98	53	53
24	74	75	83	87	585	1,230	808	1,000	286	91	56	53
25	74	77	89	87	599	1,260	760	885	270	87	57	54
26	72	77	95	89	648	1,210	648	876	250	81	55	55
27	72	79	95	100	669	1,090	746	966	242	79	54	54
28	72	89	91	108	768	1,430	832	1,000	238	77	53	54
29	74	87	95	120	.....	1,460	921	984	234	75	53	53
30	81	85	95	128	.....	1,430	840	912	234	74	52	53
31	83	.....	98	128	.....	1,290	.....	894	.....	74	50	.....

NOTE.—Discharge determined from a well-defined rating curve. Stage-discharge relation affected by ice Jan. 14; discharge estimated from discharge measurement. No record Aug. 2–10; discharge interpolated.

Monthly discharge of Middle Fork of Feather River, near Cromberg, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	110	63	74.5	4,580	B.
November	95	69	78.0	4,640	B.
December	110	79	91.4	5,620	B.
January	214	72	103	6,330	B.
February	894	258	516	28,700	A.
March	1,500	634	1,090	67,000	A.
April	1,450	648	1,100	65,500	A.
May	4,750	690	1,460	89,800	A.
June	930	234	472	28,100	A.
July	226	74	126	7,750	B.
August	74	50	58.5	3,600	B.
September	57	51	53.1	3,160	B.
The year	4,750	50	434	315,000	

MIDDLE FORK OF FEATHER RIVER NEAR OROVILLE, CAL.

LOCATION.—In the NW. ¼ sec. 32, T. 20 N., R. 5 E., at highway bridge at Bidwell Bar, 2 miles above junction with the North Fork, and 7 miles northeast of Oroville, Butte County. South Fork enters 1¼ miles above and Canyon Creek three-fourths of a mile below the station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 7, 1911, to September 30, 1915.

Digitized by Google

GAGE.—Vertical staff in three sections, read once a day by T. W. Curry. High-water section is fastened to lower end of bridge pier near left bank. Remainder of gage is fastened to a sycamore tree on left bank, 100 feet above bridge.

DISCHARGE MEASUREMENTS.—Made from car and cable installed April 1, 1914, 250 feet below bridge.

CHANNEL AND CONTROL.—Boulder and gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 15.5 feet at noon, May 11 (discharge, 25,300 second-feet, computed from extension of rating curve and may be subject to error); minimum stage recorded, 2.20 feet, October 1 and 2 (discharge, 255 second-feet).

1911–1915: Maximum stage recorded, 18.0 feet at 4 p. m., December 31, 1913 (discharge, 34,200 second-feet, computed from extension of rating curve and may be subject to error); minimum stage recorded, 2.18 feet, September 24–25, 1913 (discharge, 177 second-feet).

DIVERSIONS.—The Palermo Land & Water Co.'s canal and South Feather Land & Water Co.'s canal divert from South Fork of Feather River and tributaries.

REGULATION.—None.

ACCURACY.—Results good.

Discharge measurements of Middle Fork of Feather River near Oroville, Cal., during the year ending Sept. 30, 1915.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Feb. 7	5.31	2,060
Apr. 14	7.98	5,640

Daily discahrge, in second-feet, of Middle Fork of Feather River near Oroville, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	255	360	360	360	7,300	3,310	5,470	4,970	5,300	1,150	460	280
2	255	390	330	360	14,600	3,050	5,300	4,180	5,130	1,080	460	275
3	280	375	585	360	6,730	2,800	5,820	3,730	4,650	1,020	442	280
4	280	330	500	500	4,180	2,560	6,540	3,450	4,330	1,020	425	275
5	275	330	540	425	3,050	2,560	5,820	3,450	4,180	960	425	275
6	268	318	500	630	2,340	2,560	5,300	3,450	4,030	960	408	275
7	268	318	500	562	2,040	2,560	5,130	3,730	4,030	960	390	275
8	268	310	442	900	3,050	2,560	5,130	4,330	3,880	900	390	275
9	285	310	460	785	6,730	2,560	4,970	5,130	3,590	900	390	268
10	305	310	500	585	5,130	2,450	5,300	12,700	3,310	840	390	268
11	330	310	730	480	3,590	2,340	5,640	23,600	3,050	840	375	260
12	305	318	520	608	2,800	2,340	6,360	22,000	2,680	785	375	260
13	280	318	442	630	2,140	2,560	6,540	15,600	2,450	785	360	275
14	275	330	390	2,240	1,940	2,920	5,820	12,000	2,340	730	360	280
15	275	318	345	1,290	1,860	3,450	5,470	10,200	2,240	730	360	280
16	268	318	390	900	1,940	3,880	6,000	9,540	2,140	680	345	285
17	280	310	425	680	7,680	4,030	6,730	11,100	2,040	655	330	280
18	500	310	425	585	6,920	4,330	6,920	11,100	1,940	630	330	275
19	390	305	390	520	5,300	4,330	7,300	9,760	1,860	630	330	268
20	705	305	500	500	4,970	4,180	7,110	8,280	1,760	608	325	260
21	460	305	390	460	3,880	4,180	6,540	7,110	1,680	585	318	255
22	375	305	375	460	3,880	4,330	5,820	6,730	1,600	585	310	255
23	330	305	390	425	3,880	4,490	5,470	6,540	1,520	540	305	255
24	330	305	375	425	3,880	4,810	4,810	7,110	1,520	540	305	255
25	318	305	360	540	3,880	4,810	4,490	5,820	1,440	540	305	255
26	310	305	360	608	3,450	4,810	4,180	5,640	1,360	520	305	255
27	305	305	375	730	3,310	4,330	4,490	6,000	1,290	500	305	268
28	305	785	375	2,800	3,730	7,490	5,300	6,180	1,220	500	305	268
29	305	425	345	2,340	.....	8,480	6,000	6,180	1,220	480	285	268
30	360	390	360	2,340	.....	6,540	6,180	5,640	1,150	480	280	260
31	360	.....	345	2,680	.....	5,820	.....	5,470	.....	460	280	.....

NOTE.—Discharge determined from a rating curve well defined below and extended above 10,000 second-feet.

Digitized by Google

Monthly discharge of Middle Fork of Feather River near Oroville, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	705	255	326	20,000	A.
November	785	305	341	20,300	A.
December	730	330	430	26,400	A.
January	2,800	360	894	55,000	A.
February	14,600	1,860	4,440	247,000	B.
March	8,480	2,340	3,920	241,000	A.
April	7,300	4,180	5,730	341,000	A.
May	23,600	3,450	8,090	497,000	B.
June	5,300	1,150	2,630	156,000	A.
July	1,150	460	729	44,800	A.
August	460	280	354	21,800	A.
September	285	255	269	16,000	B.
The year	23,600	255	2,330	1,690,000	

SOUTH FORK OF FEATHER RIVER AT ENTERPRISE, CAL.

LOCATION.—In the NE. ¼ sec. 1, T. 19 N., R. 6 E., one-half mile above highway bridge at Enterprise, Butte County, about 800 feet above mouth of Powell Creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 8, 1911, to September 30, 1915.

GAGE.—Inclined staff, read once a day by Gus Alm. It is bolted to ledge on right bank, and was installed November 9, 1913. Original gage, located 150 feet downstream, consisted of two vertical sections on left bank; read till November 8, 1913.

DISCHARGE MEASUREMENTS.—Made from car and cable, 90 feet below gage, or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; shifts during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.7 feet, at 2.10 p. m., May 11 (discharge, 9,930 second-feet, computed from extension of rating curve and may be subject to error); minimum stage recorded, 2.35 feet, October 1–10 and 14–16 (discharge, 1. 8 second-feet).

1911–1915: Maximum stage recorded, 12.0 feet, December 31, 1913 (discharge, 10,400 second-feet, computed from extension of rating curve and may be subject to error); minimum stage recorded, 0.58 foot, September 29–30, October 1–3 and 7–10, 1913 (discharge, 0.9 second-foot).

DIVERSIONS.—The diversion dam of the Palermo Land & Water Co.'s canal is located 1 mile above the station. The South Feather Land & Water Co.'s canal diverts from Lost and Pinkard Creeks, above the station. This water is used for irrigation in the vicinity of Wyandotte and Bangor.

REGULATION.—None.

ACCURACY.—Results fair.

Discharge measurements of South Fork of Feather River at Enterprise, Cal., during the year ending Sept. 30, 1916.

[Made by Charles Leidl.]

Date.	Gage height.		Discharge.
	Left bank.	Right bank.	
	Feet.	*Feet.*	*Sec.-ft.*
Feb. 8	3.70	5.02	916
Apr. 13	4.25	5.55	1,280

Digitized by Google

Daily discharge, in second-feet, of South Fork of Feather River at Enterprise, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.8	34	34	53	2,620	700	1,180	980	835	140	42	2.3
2	1.8	34	24	46	3,190	640	1,140	905	765	140	36	2.3
3	1.8	29	76	46	1,550	580	1,300	765	765	140	30	2.3
4	1.8	29	108	76	1,060	552	1,300	670	700	113	30	2.3
5	1.8	24	108	76	800	525	1,260	670	640	113	30	2.3
6	1.8	24	76	120	640	525	1,140	732	640	113	30	2.3
7	1.8	24	76	96	525	498	1,220	732	610	113	24	2.3
8	1.8	24	68	284	905	498	1,140	905	580	113	24	2.3
9	1.8	24	60	164	1,510	470	1,140	2,310	525	90	18	2.3
10	1.8	24	96	108	1,640	470	1,140	4,810	498	90	18	2.3
11	3.8	20	120	96	905	470	1,140	8,400	470	90	18	2.3
12	3.8	20	120	120	700	470	1,300	6,100	446	90	18	2.3
13	2.5	20	76	148	640	498	1,300	3,070	422	90	18	2.3
14	1.8	24	86	525	525	525	1,180	2,410	398	80	18	2.3
15	1.8	24	86	470	445	580	1,180	1,820	375	71	13	2.8
16	1.8	24	68	396	835	610	1,300	1,640	352	71	13	2.3
17	2.5	20	60	266	2,410	640	1,340	2,110	329	71	8.7	2.3
18	60	20	60	164	1,550	640	1,340	2,210	306	71	8.7	2.3
19	60	20	60	120	1,140	670	1,460	2,110	283	56	8.7	2.3
20	120	20	76	108	1,220	700	1,340	1,730	260	56	8.7	2.3
21	40	16	60	76	980	732	1,220	1,460	237	56	5.6	2.3
22	40	16	60	76	835	765	1,140	1,260	237	56	5.6	2.3
23	24	16	60	76	905	835	1,140	1,220	219	48	5.6	2.3
24	20	16	60	76	980	870	1,020	1,300	202	42	5.6	2.3
25	20	16	46	120	835	870	905	1,060	202	42	5.6	2.3
26	20	16	46	108	800	870	835	980	170	42	5.6	3.3
27	20	20	60	212	732	870	905	980	170	42	3.3	3.3
28	16	164	60	835	800	1,820	1,060	942	170	42	3.3	3.3
29	16	46	46	610	.....	1,960	1,300	1,060	140	42	3.3	3.3
30	34	34	46	700	.....	1,550	1,340	980	140	42	3.3	3.3
31	40	.....	46	800	.....	1,220	.....	835	.....	.....	2.3	.....

NOTE.—Discharge determined from a rating curve well defined between 800 and 1,400 second-feet and fairly well defined below 4,000 second-feet. No record June 12–20; discharge interpolated.

Monthly discharge of South Fork of Feather River at Enterprise, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	120	1.8	18.3	1,130	C.
November	164	16	28.1	1,670	C.
December	120	24	68.6	4,220	C.
January	835	46	231	14,200	B.
February	3,190	445	1,130	62,800	A.
March	1,960	470	762	46,900	B.
April	1,460	835	1,190	70,800	A.
May	8,400	670	1,840	113,000	B.
June	835	140	403	24,000	C.
July	140	42	77.6	4,770	C.
August	42	2.3	15.0	922	C.
September	3.3	2.3	2.47	147	C.
The year	8,400	1.8	476	345,000	

PALERMO LAND & WATER CO.'S CANAL AT ENTERPRISE, CAL.

LOCATION.—In the NE. ¼ sec. 1, T. 19 N., R. 6 E., 1,000 feet above Alm's residence at Enterprise, Butte County, and three-fourths mile below intake at diversion dam on South Fork of Feather River.

RECORDS AVAILABLE.—October 8, 1911, to September 30, 1915.

GAGE.—Vertical staff on right wall of concrete approach to sheet-iron flume, read once a day by Gus Alm. Original gage was vertical staff fastened to post on right bank about one-fourth mile below. November 9, 1913, its datum was lowered

Digitized by Google

1.00 foot. This gage was read up to March 31, 1914, and it was also read from March 15 to April 13, 1915, during rebuilding of flume just above it. From April 1, 1914, to March 14, 1915, readings were taken from a gage about 800 feet above old gage, installed March 22, 1914, in the flume. Present gage was installed April 13, 1915. Readings on it began April 14. The relations between the three gages used have not been determined.

DISCHARGE MEASUREMENTS.—Made from foot plank at gage.

CHANNEL AND CONTROL.—Composed of concrete. Control is throat of approach to metal flume. Control at original station is a length of the channel which is composed of gravel and sand. The control for the gage which was in the old wooden flume was also a length of channel.

EXTREMES OF DISCHARGE.—1911–1915: Maximum discharge, 40 second-feet, July 24, 1914; no flow during parts of each year.

ACCURACY.—Results excellent. Rating curves well defined.

Canal furnishes water for irrigation below Oroville.

Discharge measurements of Palermo Land & Water Co.'s canal at Enterprise, Cal., during the year ending Sept. 30, 1915.

[Made by Charles Leidl.]

Date.	Gage height.[a]	Gage height.	Discharge.	Date.	Gage height.[a]	Gage height.	Discharge.
	Feet.	*Feet.*	*Sec.-ft.*		*Feet.*	*Feet.*	*Sec.-ft.*
Feb. 8	.....	[b] 0.18	1.6	Apr. 13	2.20	[c] 2.09	32
Apr. 13	1.72	[c] 1.60	19	13	1.30	[c] 1.04	9.1

[a] Old gage; datum established Nov. 9, 1913. [b] Gage in old wooden flume.
[c] New gage installed Apr. 13, 1915.

Daily discharge, in second-feet, of Palermo Land & Water Co.'s canal at Enterprise, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	25	18.2	18.5	15.0	5.7	22	5.6	21	27	38	38	35
2	25	18.2	18.5	15.2	2.4	22	4.0	21	27	38	38	35
3	29	18.2	19.2	15.2	1.4	22	4.8	21	27	38	38	35
4	28	18.2	11.8	15.5	4.4	22	17.0	20	27	38	38	35
5	27	18.2	11.8	15.5	4.2	22	18.2	20	32	38	38	34
6	27	18.2	11.8	15.8	4.2	22	18.2	20	32	38	38	34
7	26	18.0	11.8	15.5	4.2	22	18.2	20	35	38	38	34
8	27	18.0	11.8	16.5	1.8	22	18.2	20	35	38	38	34
9	30	18.0	11.8	11.6	1.7	22	18.2	17.2	37	38	38	33
10	31	18.0	11.8	13.0	2.0	22	18.2	14.4	36	38	37	33
11	31	18.0	12.1	13.0	2.0	22	18.2	11.4	37	37	38	33
12	30	18.0	12.1	13.0	1.7	.0	.6	10.6	37	38	38	34
13	30	18.2	12.1	13.3	1.7	16.5	5.1	10.0	37	38	37	34
14	29	18.2	12.1	12.1	1.7	20	21	17.6	37	38	37	36
15	28	18.2	14.8	11.6	21	.0	21	17.2	36	38	38	34
16	28	18.2	15.5	11.1	13.3	.0	22	17.4	36	38	38	34
17	30	18.2	15.5	11.1	.0	.0	22	17.6	36	37	38	34
18	19.5	18.2	15.5	23	23	.0	22	3.6	38	37	38	33
19	19.5	18.2	15.5	23	23	2.0	22	6.4	38	37	38	32
20	20	18.2	15.5	23	23	15.8	22	17.4	37	37	38	31
21	19.2	18.2	15.5	23	22	15.8	22	17.2	37	38	38	31
22	19.0	18.2	15.5	18.5	22	15.8	21	17.2	37	38	38	31
23	18.8	18.5	15.5	15.5	22	15.8	21	17.2	37	38	38	31
24	19.0	18.5	15.5	15.8	22	15.8	21	17.0	37	38	38	31
25	19.0	18.5	15.5	16.0	22	15.8	21	17.2	38	38	38	31
26	19.0	18.5	15.5	16.0	22	15.8	21	17.2	38	38	38	31
27	19.0	18.5	15.5	11.6	22	15.8	21	17.2	38	38	38	31
28	19.0	19.5	15.5	12.5	22	13.5	21	17.2	38	36	37	31
29	19.0	18.8	15.5	12.5	.....	7.4	21	21	38	38	36	31
30	19.5	18.5	15.5	12.5	.....	6.5	21	27	38	38	36	31
31	19.5	.....	15.5	6.0	.....	5.6	.....	27	.....	38	35	.....

NOTE.—Owing to changes in gage, daily discharge determined from three rating curves as follows: Oct. 1 to Mar. 14, well defined; Mar. 15 to Apr. 13, well defined above 5.0 second-feet; Apr. 14 to Sept. 30, well defined.

Digitized by Google

Monthly discharge of Palermo Land & Water Co.'s canal at Enterprise, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	31	18.8	24.2	1,490	A.
November	19.5	18.0	18.3	1,090	A.
December	19.2	11.8	14.5	892	A.
January	23	6.0	14.9	916	A.
February	23	.0	11.4	633	A.
March	22	.0	14.2	873	A.
April	22	.6	17.6	1,050	A.
May	27	3.6	17.3	1,060	A.
June	38	27	35.3	2,100	A.
July	38	37	37.8	2,320	A.
August	38	35	37.6	2,310	A.
September	36	31	32.9	1,960	A.
The year	38	.0	23.1	16,700	

MIDDLE FORK OF YUBA RIVER[1] NEAR NORTH SAN JUAN, CAL.

LOCATION.—In the N. ½ NW. ¼ sec. 23, T. 18 N., R. 8 E., below highway bridge at Freeman's Crossing, in Tahoe National Forest, 1¼ miles northeast of North San Juan, Nevada County. Moonshine Creek enters one-fourth mile below, Oregon Creek three-fourths mile above, and North Fork of Yuba River about 4 miles below the station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 27, 1910, to September 30, 1915.

GAGE.—Vertical staff wedged between two large boulders on right bank one-fourth mile below bridge; read once a day by Henry Zurhorst.

DISCHARGE MEASUREMENTS.—Made from car and cable 200 feet above gage or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.7 feet at 10 a. m. May 12 (discharge, 14,300 second-feet); minimum stage recorded, 4.32 feet October 1, 2 and 16 (discharge, 40 second-feet).

1910–1915: Maximum stage recorded, 11.7 feet at 10 a. m. May 12, 1915 (discharge, 14,300 second-feet); minimum stage recorded, 4.30 feet September 23 to 27, 1914 (discharge, 35 second-feet).

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Results good.

Discharge measurements of Middle Fork of Yuba River near North San Juan, Cal., during the year ending Sept. 30, 1915.

[Made by H. J. Tompkins.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 24	4.39	56	Feb. 3	6.35	1,160	May 17	7.55	2,970
Jan. 28	5.70	674	May 11	11.50	13,700	Aug. 28	4.49	57

[1] Known locally as Middle Yuba River.

Digitized by Google

Daily discharge, in second-feet, of Middle Fork of Yuba River near North San Juan, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	40	100	72	100	3,520	715	1,040	990	1,920	355	90	55
2	40	100	72	109	3,520	655	1,040	750	1,840	330	83	55
3	60	91	182	109	1,400	600	1,280	715	1,480	330	78	55
4	60	80	80	160	785	572	1,130	655	1,360	282	78	55
5	60	72	85	145	600	545	1,080	628	1,360	238	78	55
6	55	65	115	210	545	545	1,040	715	1,480	238	78	50
7	55	60	130	175	450	495	1,080	785	1,540	238	78	46
8	55	60	109	228	860	495	1,040	860	1,610	238	74	46
9	72	60	85	182	1,400	495	945	2,500	1,360	198	74	46
10	85	60	139	145	945	495	1,130	6,100	1,240	198	74	46
11	72	60	145	145	655	495	1,230	7,410	1,030	198	74	46
12	65	60	130	175	572	495	1,400	14,300	840	191	68	46
13	60	60	100	245	495	520	1,450	5,110	800	169	68	46
14	55	72	55	520	472	600	1,130	3,520	760	162	68	55
15	48	60	85	370	450	655	1,080	2,760	722	162	62	58
16	40	60	100	288	545	715	1,340	2,560	685	146	62	50
17	60	60	115	253	2,600	750	1,570	2,870	615	136	74	50
18	85	60	100	242	2,150	785	1,700	3,960	650	130	68	46
19	115	60	100	225	1,450	785	1,770	3,080	582	130	62	50
20	175	60	85	225	1,230	785	1,840	2,560	550	124	58	55
21	115	60	60	219	860	785	1,450	2,090	520	116	58	50
22	85	60	60	210	785	860	1,280	1,840	490	108	58	50
23	80	55	60	195	860	945	1,180	1,760	490	108	58	46
24	72	55	72	201	945	1,040	945	1,760	490	108	58	46
25	72	60	72	242	860	945	945	1,480	435	102	58	46
26	65	60	85	260	785	945	785	1,480	380	102	58	50
27	65	60	109	370	715	785	945	1,760	380	97	55	50
28	65	115	100	655	822	2,070	1,040	2,090	380	97	55	50
29	65	85	100	572	.....	1,510	1,040	2,090	380	90	62	50
30	91	85	100	600	.....	1,130	1,230	1,760	380	90	55	50
31	85	.....	91	715	.....	1,040	.....	1,920	.....	90	55	.....

NOTE.—Daily discharge determined from three rating curves as follows: Oct. 1 to Jan. 14 and Jan. 15 to May 12, fairly well defined; May 13 to Sept. 30 well defined.

Monthly discharge of Middle Fork of Yuba River near North San Juan, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	175	40	71.5	4,400	B.
November	115	55	68.5	4,080	B.
December	182	60	96.5	5,930	B.
January	715	100	274	16,800	B.
February	3,520	450	1,120	62,200	B.
March	2,070	495	782	48,100	B.
April	1,840	785	1,210	72,000	B.
May	14,300	628	2,670	164,000	B.
June	1,920	380	892	53,100	A.
July	355	90	171	10,500	A.
August	90	55	67.1	4,130	A.
September	55	46	50.1	2,980	A.
The year	14,300	40	617	448,000	

Digitized by Google

YUBA RIVER AT SMARTSVILLE, CAL.

LOCATION.—In sec. 22, T. 16 N., R. 6 E., at Narrows, 1 mile north of Smartsville, Yuba County, 1 mile below mouth of Deer Creek, 6½ miles below mouth of South Fork, 7 miles above mouth of Dry Creek, and 18 miles above the junction with Feather River.

DRAINAGE AREA.—1,220 square miles.

RECORDS AVAILABLE.—June 2, 1903, to September 30, 1915.

GAGE.—Staff in three sections, bolted to solid rock on left bank, read to quarter-tenths once a day by Joseph French. On account of the gradual erosion of the channel the gage datum was lowered 10 feet on August 1, 1906. Before the change, first section was vertical and driven into gravel near left bank 50 feet below cable; second section was painted on rock ledge on left bank.

DISCHARGE MEASUREMENTS.—Made from car and cable at gage.

CHANNEL AND CONTROL.—Gravel and small boulders; shifts during high water. As the result of extensive hydraulic mining in the early days, the channel has been filled with an enormous quantity of tailings. At the station the depth of mining débris is estimated to be more than 80 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 20.0 feet at 9.15 a. m. May 12 (discharge, 46,500 second-feet); minimum discharge, 285 second-feet, October 1.

1903–1915: Maximum stage recorded, 28.3 feet January 15, 1909 (discharge, 111,000 second-feet); minimum stage recorded, 3.23 feet October 5, 1913 (discharge, 216 second-feet).

DIVERSIONS.—Water is diverted for power and irrigation above the station. Also see next paragraph.

REGULATION.—Several small glacial lakes near the headwaters of the South Fork of Yuba are utilized as storage reservoirs. A part of this water is diverted into the Bear and American River drainage basins.

ACCURACY.—Conditions for obtaining accurate discharge data at high stages are poor, owing to the shifting of the channel and the torrential nature of the stream. Results, except at high stages, are good.

Discharge measurements of Yuba River at Smartsville, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 21	H. J. Tompkins.....	4.00	373	Apr 12	Charles Leidl.....	8.41	7,300
Feb. 12	Charles Leidl.....	7.20	4,110	May 19	H. J. Tompkins.....	11.52	13,500

Digitized by Google

Daily discharge, in second-feet, of Yuba River at Smartsville, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	285	402	458	515	24,200	5,250	6,250	6,450	9,000	1,520	472	348
2	330	698	485	545	24,800	4,720	6,050	5,450	8,800	1,470	472	348
3	330	485	1,010	545	12,800	4,380	7,350	5,080	7,250	1,350	456	348
4	352	458	865	935	7,010	4,050	7,580	4,550	6,700	1,230	440	348
5	330	430	935	730	4,690	3,750	7,120	4,720	6,500	1,160	440	348
6	330	402	762	1,120	3,430	3,600	6,050	4,900	6,700	1,060	440	348
7	330	375	795	935	3,110	3,300	6,450	5,650	9,000	1,020	440	333
8	308	330	665	2,670	6,570	3,450	6,050	6,250	7,250	962	440	333
9	352	375	635	1,240	9,500	3,600	5,650	15,600	6,700	904	424	333
10	430	402	935	900	8,160	3,450	6,450	27,200	5,700	850	424	318
11	458	375	972	830	5,290	3,300	6,680	41,900	5,150	825	408	318
12	375	352	795	1,080	3,950	3,450	7,350	46,500	4,500	800	408	318
13	352	330	698	1,580	3,270	3,300	7,580	25,600	3,880	776	408	318
14	352	308	575	4,630	2,820	3,750	6,250	18,600	3,540	752	408	318
15	330	330	545	1,860	2,680	4,200	6,050	16,100	4,240	729	408	318
16	308	330	575	1,240	3,270	4,380	7,120	12,800	3,710	706	408	318
17	375	308	698	1,080	14,700	4,720	8,020	16,100	3,380	662	408	318
18	545	330	665	935	12,300	5,080	7,800	16,700	3,230	620	393	318
19	458	308	698	865	8,020	4,900	11,200	13,700	2,960	600	393	318
20	1,010	285	830	830	8,250	4,720	10,600	11,400	2,820	580	378	304
21	575	375	635	795	6,450	5,080	9,150	9,160	2,700	580	378	304
22	458	375	575	762	6,250	5,250	7,580	7,850	2,580	542	378	304
23	430	375	545	730	6,450	5,650	7,350	7,610	2,580	542	378	290
24	402	402	545	698	6,680	6,050	6,450	7,150	2,350	542	378	290
25	375	375	515	935	6,250	5,450	6,050	6,050	2,130	542	378	290
26	375	352	545	1,010	5,650	5,650	5,450	5,840	1,930	524	378	290
27	375	375	575	1,320	5,080	6,680	6,450	7,150	1,790	506	378	290
28	402	730	545	4,440	6,050	12,300	8,020	9,970	1,740	506	363	290
29	430	545	515	3,230	.....	9,850	9,850	10,000	1,650	506	363	304
30	485	515	545	3,080	.....	6,900	8,480	9,500	1,560	489	348	304
31	515	.....	515	7,900	.....	6,450	.....	8,800	.....	472	348	.....

NOTE.—Discharge computed from five rating curves as follows: Oct. 1 to Feb. 2, fairly well defined; Feb. 3-17, well defined; Feb. 18 to May 12, fairly well defined; May 13-28, poorly defined; and May 29 to Sept. 30, computed by indirect method for shifting control.

Monthly discharge of Yuba River at Smartsville, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1,010	285	412	25,300	B.
November	730	285	401	23,900	B.
December	1,010	458	666	41,000	B.
January	7,900	515	1,610	99,000	B.
February	24,800	2,680	7,770	432,000	C.
March	12,300	3,300	5,050	311,000	B.
April	11,200	5,450	7,280	433,000	B.
May	46,500	4,550	12,700	781,000	C.
June	9,000	1,560	4,400	262,000	
July	1,520	472	785	48,300	
August	472	348	404	24,800	
September	348	290	318	18,900	
The year	46,500	285	3,450	2,500,000	.....

OREGON CREEK NEAR NORTH SAN JUAN, CAL.

LOCATION.—In the N. ½ SE. ¼ sec. 28, T. 18 N., R. 8 E., below highway bridge, in Tahoe National Forest, 500 feet above junction with Middle Fork of Yuba River, half a mile above Freemans Crossing, Yuba County, and 2 miles northeast of North San Juan, Nevada County.

DRAINAGE.—Not measured.

Digitized by Google

RECORDS AVAILABLE.—October 28, 1910, to September 30, 1915.

GAGE.—Vertical staff fastened to an alder tree on right bank 150 feet below bridge, read once a day by H. Zurhorst.

DISCHARGE MEASUREMENTS.—Made from car and cable, 30 feet below gage or by wading.

CHANNEL AND CONTROL.—Small boulders and gravel; shifts during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.65 feet at 10 a. m. May 12 (discharge, 1,620 second-feet); minimum stage recorded, 3.70 feet October 1, 2, and 29 (discharge, 4 second-feet).

1910–1915: Maximum stage recorded, 8.5 feet at 5 p. m. December 31, 1913 (discharge, 4,080 second-feet, determined from extension of rating curve and may be subject to error); minimum stage recorded. 3.70 feet September 13 to 20, 1913 (discharge, 2 second-feet).

DIVERSION.—None.

REGULATION.—None.

ACCURACY.—Results good.

Discharge measurements of Oregon Creek near North San Juan, Cal., during the year ending Sept. 30, 1915.

[Made by H. J. Tompkins.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 24	3.80	6.8	Feb. 3	5.34	396	May 18	5.75	636
Jan. 28	4.94	189	May 11	6.60	1,560	Aug. 28	3.81	6.6

Daily discharge, in second-feet, of Oregon Creek near North San Juan, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4	11	7	10	1,140	246	278	145	115	23	11	8
2	4	11	7	11	970	210	255	160	108	23	10	7
3	6.5	10	23	11	394	232	278	120	97	21	10	6.5
4	5.5	8	17	16	246	175	255	108	93	21	10	6.5
5	5.5	7	17	14	175	169	255	108	87	21	10	7
6	5.5	8	14	30	145	160	246	108	81	19	10	7
7	4.5	7	14	23	125	151	255	102	77	19	7	7
8	4.5	7	11	35	255	145	232	108	69	19	7	7
9	8	7	10	21	350	145	232	300	64	19	7	7
10	9	7	14	17	255	145	255	405	61	21	7	7
11	7	7	17	14	175	145	232	1,440	61	17	7	7
12	7	7	14	17	151	145	255	1,620	58	17	7	7
13	5.5	7	11	41	132	160	232	780	54	17	7	7
14	5.5	9	8	120	120	175	246	535	54	17	7	7
15	5.5	7	9	47	115	203	255	378	50	17	7	7
16	4.5	7	10	30	132	210	232	350	47	16	7	7
17	5.5	7	11	23	780	210	232	350	45	16	7	7
18	6.5	7	11	19	690	219	210	650	41	14	7	7
19	9	7	11	17	465	219	210	535	35	14	7	7
20	14	7	11	17	405	210	210	405	37	14	7	7
21	11	7	10	16	300	210	192	340	37	14	7	7
22	9	7	10	16	264	210	175	278	35	12	7	7
23	7	7	10	12	300	219	175	246	35	12	7	8
24	6.5	7	10	14	340	219	151	255	33	12	7	8
25	6.5	7	10	35	300	210	145	210	33	11	7	8
26	5.5	7	11	33	255	210	125	175	30	11	7	10
27	4.5	7	11	61	232	192	132	169	27	11	7	8
28	4.5	14	11	192	255	465	145	151	25	11	7	7
29	4	11	10	145	.....	394	160	145	25	11	7	7
30	10	9	10	151	.....	300	175	132	25	11	7	7
31	8	.....	10	210	.....	291	.....	120	.....	11	7	.....

NOTE.—Discharge determined from a rating curve fairly well defined below 2,000 second-feet.

Digitized by Google

Monthly discharge of Oregon Creek near North San Juan, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	14	4	6.56	403	C.
November	14	7	7.93	472	C.
December	23	7	11.6	713	C.
January	210	10	45.7	2,810	B.
February	1,140	115	338	18,800	B.
March	465	145	213	13,100	B.
April	278	125	214	12,700	B.
May	1,620	102	353	21,700	B.
June	115	25	54.6	3,250	B.
July	23	11	15.9	978	B.
August	11	7	7.61	468	C.
September	10	6.5	7.23	430	C.
The year	1,620	4	105	75,800	

NORTH FORK OF YUBA RIVER[1] AT GOODYEAR BAR, CAL.

LOCATION.—In the E. ½ SW. ¼ sec. 5, T. 19 N., R. 10 E., in Tahoe National Forest, at highway bridge at Goodyear Bar, Sierra County. Rock Creek and Goodyear Creek enter one-eighth and one-fourth mile, respectively, below the station and North Fork of North Fork of Yuba River enters at Downieville, 4 miles above.

DRAINAGE AREA.—214 square miles.

RECORDS AVAILABLE.—October 31, 1910, to September 30, 1915.

GAGE.—Vertical staff in two sections on left bank; read once a day by G. E. King. Low-water section is fastened to old piling under bridge, while remainder of gage is bolted to left abutment of bridge.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Solid rock, small boulders, and gravel; appears permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.5 feet at 5.40 p. m. May 11 (discharge, 12,600 second-feet); minimum stage recorded, 3.3 feet September 21 to 30 (discharge, 133 second-feet).

1910–1915: Maximum stage recorded, 11.5 feet at 5.40 p. m. May 11, 1915 (discharge, 12,600 second-feet); minimum stage recorded, 3.3 feet October 1 to 4, 13 to 21, 1912, and September 16 to October 31, 1913 (discharge, 116 second-feet).

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Results good.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of North Fork of Yuba River at Goodyear Bar, Cal., during the year ending Sept. 30, 1915.

[Made by H. J. Tompkins.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 29	3.50	185	Feb. 1	5.85	1,780	May 16	6.55	2,860
Jan. 31	4.10	448	May 10	9.20	7,970	Aug. 30	3.40	163

[1] Known locally as North Yuba River.

Digitized by Google

Daily discharge, in second-feet, of North Fork of Yuba River at Goodyear Bar, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	180	200	180	163	2,170	550	945	1,300	3,330	715	235	163
2	180	200	180	163	1,710	550	1,120	1,120	2,790	a 680	235	163
3	180	180	220	180	752	460	1,500	1,030	2,410	645	235	163
4	180	180	200	180	580	460	1,350	a1,030	2,530	645	235	163
5	180	180	200	180	460	460	1,120	a1,030	2,530	580	235	163
6	180	180	200	180	432	432	1,030	1,030	2,790	580	235	148
7	180	180	200	180	405	432	1,120	1,120	3,300	580	235	148
8	200	180	200	220	988	a 432	1,030	1,210	2,600	520	235	148
9	220	180	180	180	715	432	1,030	4,260	2,530	520	216	a 148
10	200	a 180	200	180	580	432	1,120	6,710	2,290	520	216	148
11	200	180	180	180	490	432	1,500	11,000	1,930	465	216	148
12	a 193	180	180	180	405	432	1,600	9,290	a1,760	465	216	148
13	a 186	180	163	240	405	460	1,500	4,260	1,600	415	197	148
14	180	180	163	355	380	520	1,300	3,480	1,500	415	197	148
15	163	163	163	240	380	645	1,400	3,330	1,500	415	197	148
16	163	163	163	240	715	680	a1,540	2,790	1,400	415	197	148
17	220	163	163	180	1,300	752	a1,680	3,050	1,400	365	197	148
18	220	163	163	180	945	752	1,820	2,920	1,400	365	197	148
19	355	163	163	180	715	752	2,290	2,290	1,300	320	180	148
20	240	163	163	180	715	752	2,050	a2,110	1,300	320	180	148
21	220	163	163	163	580	790	1,820	1,930	1,120	320	180	133
22	200	163	163	a 180	580	865	1,600	2,050	1,120	320	a 176	133
23	180	163	163	a 180	580	1,030	1,500	1,820	1,030	320	a 172	133
24	180	163	163	180	612	1,030	1,300	1,820	945	275	a 169	133
25	180	163	163	200	550	1,030	1,210	1,550	865	275	a 166	133
26	180	163	163	200	520	945	1,210	1,350	a 828	275	163	133
27	a 180	163	163	305	520	945	1,400	1,820	790	275	163	a 133
28	180	180	163	520	580	1,710	1,930	2,790	790	275	163	a 133
29	180	180	163	460	.....	1,210	2,170	3,050	790	275	163	133
30	180	180	163	405	.....	945	1,600	2,920	790	275	163	133
31	180	.....	163	460	.....	945	.....	a3,120	.....	275	163	.....

a Interpolated.

NOTE.—Discharge determined from two well-defined rating curves applicable Oct. 1 to May 11 and May 12 to Sept. 30. Discharge May 25–27 and June 7 and 8 estimated by comparison with records of flow of Yuba River at Smartsville and Middle Fork of Yuba River near North San Juan.

Monthly discharge of North Fork of Yuba River at Goodyear Bar, Cal., for the year ending Sept. 30, 1915.

[Drainage area, 214 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	355	163	195	0.911	1.05	12,000	B.
November	200	163	174	.813	.91	10,400	B.
December	220	163	175	.818	.94	10,800	B.
January	520	163	233	1.09	1.26	14,300	B.
February	2,170	380	706	3.30	3.44	39,200	A.
March	1,710	432	718	3.36	3.87	44,100	A.
April	2,290	945	1,460	6.82	7.61	86,900	B.
May	11,000	1,030	2,860	13.4	15.45	176,000	B.
June	3,330	790	1,710	7.99	8.91	102,000	B.
July	715	275	423	1.98	2.28	26,000	A.
August	235	163	198	.925	1.07	12,200	B.
September	163	133	146	.682	.76	8,690	B.
The year	11,000	133	748	3.50	47.55	543,000	

Digitized by Google

NORTH FORK OF NORTH FORK OF YUBA RIVER[1] AT DOWNIEVILLE, CAL.

LOCATION.—In the NE. ¼ NW. ¼ sec. 35, T. 20 N., R. 10 E., at upper highway bridge in Downieville, Sierra County, 500 feet above dam, and one-fourth mile above junction with North Fork of Yuba River. East Fork of North Fork enters onee eighth mile above, and Middle Fork of North Fork 1¼ miles above the station.

DRAINAGE AREA.—71.2 square miles.

RECORDS AVAILABLE.—November 1, 1910, to September 30, 1915.

GAGE.—Vertical staff fastened to right abutment of bridge; read twice a day by J. T. Mason.

DISCHARGE MEASUREMENTS.—Usually made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders. No change in control from 1910 to May 11, 1915.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.0 feet at 5 p. m. May 11; (discharge, 6,760 second-feet, determined from extension of rating curv- and may be subject to error); minimum stage recorded, 2.60 feet at 6 p. m. October 1 to 18 and November 2 (discharge, 42 second-feet).

1911–1915: Maximum stage recorded, 8.0 feet at 5 p. m. May 11, 1915 (discharge determined from extension of rating curve, 6,760 second-feet); minimum stage recorded, 2.55 feet October 14–18, 1912 (discharge, 36 second-feet).

DIVERSIONS.—The intake of the municipal water system of Downieville is above the station.

REGULATION.—None.

ACCURACY.—Results good. Since flood of May 11, 1915, control is partially drowned out by use of flash boards on dam, which requires use of a special rating curve. Stage-discharge relation is considerably affected at low water by operation of power plant at dam. Observer has been instructed to read gage when plant is not running. It is usually shut down between about 7.30 a. m. and about 4.30 p. m.

COOPERATION.—Gage-height record furnished by John T. Mason.

Discharge measurements of North Fork of North Fork of Yuba River at Downieville, Cal., during the year ending Sept. 30, 1915.

[Made by H. J. Tompkins.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 29	[a] 2.75	60	May 9	5.10	1,790	May 15	[b] 4.28	1,180
Jan. 30	3.0	138	14	[b] 4.45	1,310	Aug. 30	[c] 2.70	68

[a] Beginning of measurement, power plant and mill not running, stage, 2.75 feet; end of measurement both were running, stage, 2.68 feet.
[b] Power plant running, using 28 second-feet; no flashboards on dam.
[c] Power plant not running; 18-inch flashboards on dam; leakage estimated at 4 second-feet.

[1] Known locally as North Fork of North Yuba River.

Digitized by Google

Daily discharge, in second-feet, of North Fork of North Fork of Yuba River at Downieville, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	50	57	68	57	815	205	403	467	1,070	235	108	68
2	50	50	68	57	676	197	467	367	880	203	108	68
3	50	57	57	57	275	185	655	328	762	195	100	68
4	50	57	57	57	214	165	606	311	800	188	90	68
5	50	57	57	57	148	165	515	385	840	160	90	68
6	50	57	57	57	125	165	415	385	925	154	90	68
7	50	57	57	57	125	165	448	385	970	146	90	68
8	50	57	57	57	250	165	480	415	880	152	90	68
9	50	57	57	57	275	165	448	1,680	880	145	90	68
10	50	57	57	57	214	165	515	3,210	650	145	90	68
11	50	57	57	57	165	165	634	5,840	615	145	90	68
12	50	57	57	57	116	165	634	4,160	545	145	90	68
13	50	57	57	57	116	165	620	1,990	545	145	90	68
14	50	57	57	148	125	205	620	1,380	566	145	90	68
15	50	57	57	78	130	250	550	1,270	478	145	90	68
16	50	57	57	68	205	260	770	1,270	445	145	90	68
17	50	57	57	57	550	290	860	1,270	445	145	90	68
18	50	57	57	61	385	344	1,000	1,270	445	145	90	68
19	125	57	57	68	275	311	905	970	385	145	90	68
20	90	57	57	68	250	344	770	864	409	139	90	68
21	57	57	57	68	214	355	655	740	330	133	90	68
22	57	57	57	68	205	385	564	785	341	121	90	68
23	61	57	57	68	205	367	515	650	374	115	90	68
24	61	57	57	68	205	428	494	650	374	115	90	68
25	61	57	57	68	205	428	403	650	305	115	79	68
26	57	57	57	68	205	428	385	740	280	115	79	68
27	57	57	57	108	205	385	550	785	280	115	79	68
28	57	68	57	148	205	585	690	1,070	305	115	72	68
29	74	68	57	165	.....	515	770	880	271	115	68	68
30	68	68	57	148	.....	403	585	970	235	115	68	68
31	68	.....	57	165	.....	355	.....	970	.....	110	68	.....

NOTE.—Discharge determined from three rating curves as follows: Oct. 1 to May 11, well defined between 100 and 2,000 second-feet; May 12 to July 8, well defined below 2,000 second-feet (no flashboards on the dam below); July 8 to Sept. 30, fairly well defined (18-inch flashboards on the dam below).

Monthly discharge of North Fork of North Fork of Yuba River at Downieville, Cal., for the year ending Sept. 30, 1915.

[Drainage area, 71.2 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	125	50	57.8	0.812	0.94	3,550	B.
November	68	50	57.9	.813	.91	3,450	B.
December	68	57	57.7	.810	.93	3,550	B.
January	165	57	78.4	1.10	1.27	4,820	B.
February	815	116	253	3.55	3.70	14,100	A.
March	585	165	286	4.02	4.64	17,600	A.
April	1,000	385	598	8.40	9.37	35,600	A.
May	5,840	311	1,200	16.9	19.48	73,800	B.
June	1,070	235	554	7.78	8.68	33,000	A.
July	235	110	144	2.02	2.33	8,850	B.
August	108	68	87.7	1.23	1.42	5,390	B.
September	68	68	68	.955	1.07	4,050	B.
The year	5,840	50	287	4.03	54.74	208,000	

Digitized by Google

ROCK CREEK AT GOODYEAR BAR, CAL.

LOCATION.—In the W. ½ SW. ¼ sec. 5, T. 19 N., R. 10 E., at footbridge at Goodyear Bar, Sierra County, in Tahoe National Forest. Woodruff Creek enters 350 feet above and Rock Creek joins the North Fork of Yuba River 600 feet below the station.

DRAINAGE AREA.—10.8 square miles.

RECORDS AVAILABLE.—October 30, 1910, to September 30, 1915.

GAGE.—Vertical staff fastened to an alder tree on right bank 40 feet below bridge, read once a day by G. E. King.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Rough; composed of boulders and gravel; somewhat shifting during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.0 feet at 6 p. m. May 11 (discharge, 573 second-feet); minimum stage recorded, 0.85 foot November 25–27 (discharge, 0.8 second-foot).

1910–1915: Maximum stage recorded, 7.0 feet at 3.30 p. m. December 31, 1913 (roughly approximated discharge determined from extension of rating curve, 820 second-feet); minimum stage recorded, 2.0 feet during parts of August and September, 1911 and 1913 (discharge, 0.5 second-foot).

DIVERSIONS.—Three small ditches (total capacity about 10 second-feet), head above the station.

REGULATION.—None.

ACCURACY.—Results fair. Rating curve, which has been applicable since January 1, 1914, is fairly well defined.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Rock Creek at Goodyear Bar, Cal., during the year ending Sept. 30, 1915.

[Made by H. J. Tompkins.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 29	1.05	1.8	Feb. 1	4.00	442	May 16	2.85	120
Jan. 31	2.15	51	May 10	4.20	384	Aug. 30	.98	1.2

Digitized by Google

Daily discharge, in second-feet, of Rock Creek at Goodyear Bar, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.1	1.5	1.2	1.2	362	50	83	73	46	6.0	1.0	1.0
2	1.1	1.5	2.5	1.2	235	42	94	63	39	a 6.0	1.0	1.0
3	1.1	1.5	2.0	6.0	88	39	106	54	39	6.0	1.0	1.0
4	1.1	1.5	1.5	4.0	54	39	94	a 51	33	5.0	1.0	1.0
5	1.1	1.5	2.0	3.2	46	36	83	a 48	30	4.0	1.0	1.0
6	1.1	1.5	2.0	2.5	36	33	78	46	27	4.0	1.0	1.0
7	1.1	1.5	2.0	2.5	33	33	88	46	a 27	3.2	1.0	1.0
8	1.4	1.5	1.5	7.5	126	a 33	83	46	a 27	3.2	1.0	1.0
9	1.4	1.5	1.5	4.0	83	33	83	197	27	3.2	1.0	a 1.0
10	1.4	a 1.4	1.5	3.2	54	33	83	408	27	2.5	1.0	1.0
11	1.4	1.2	1.5	3.2	42	33	94	525	22	2.5	1.0	1.0
12	a 1.3	1.2	1.5	4.0	36	33	94	454	a 20	2.5	1.0	1.0
13	a 1.2	1.2	1.5	17	30	39	83	235	17	2.5	1.0	1.0
14	1.1	1.2	1.2	27	30	46	83	163	17	2.5	1.0	1.0
15	1.1	1.2	1.0	13	27	54	83	147	17	2.0	1.0	1.0
16	1.1	1.2	1.0	9.0	94	54	a 90	133	17	2.0	1.0	1.0
17	1.1	1.2	1.0	6.0	215	58	a 98	180	13	2.0	1.0	1.0
18	1.1	1.2	1.0	6.0	119	58	106	197	17	2.0	1.0	1.0
19	9.8	1.2	1.0	5.0	94	58	119	163	13	1.5	1.0	1.0
20	2.8	1.2	1.0	5.0	78	58	106	a 141	13	1.5	1.0	1.0
21	2.2	1.2	1.0	4.0	58	58	94	119	9.0	1.0	1.0	1.0
22	1.7	1.2	1.0	a 4.0	58	63	83	106	9.0	1.0	a 1.0	1.0
23	1.7	1.0	1.0	a 4.0	63	73	73	94	9.0	1.0	a 1.0	1.0
24	1.7	1.0	1.0	4.0	68	73	73	94	9.0	1.5	a 1.0	1.0
25	1.7	.8	1.0	7.5	63	73	63	a 88	9.0	1.5	a 1.0	1.0
26	1.7	.8	1.2	6.0	54	68	63	a 83	a 7.5	1.5	1.0	1.0
27	a 1.7	.8	1.5	39	50	73	73	a 78	6.0	1.5	1.0	a 1.0
28	1.7	1.0	1.5	46	54	133	83	73	4.0	1.0	1.0	a 1.0
29	1.5	1.5	1.2	39	.....	106	119	73	4.0	1.0	1.0	1.0
30	1.5	1.5	1.2	46	.....	83	83	63	4.0	1.0	1.0	1.0
31	1.5	.....	1.2	54	.....	83	.....	a 54	.....	1.0	1.0	.....

a Interpolated.

NOTE.—Discharge determined from a fairly well defined rating curve.

Monthly discharge of Rock Creek at Goodyear Bar, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	9.8	1.1	1.69	104	C.
November	1.5	.8	1.26	75	D.
December	2.5	1.0	1.36	84	C.
January	54	1.2	12.4	762	B.
February	362	27	83.9	4,660	B.
March	133	33	56.4	3,470	B.
April	119	63	87.9	5,230	B.
May	525	46	139	8,550	C.
June	46	4.0	18.6	1,110	B.
July	6.0	1.0	2.49	153	C.
August	1.0	1.0	1.0	61	D.
September	1.0	1.0	1.0	60	D.
The year	525	.8	33.5	24,300	

GOODYEAR CREEK AT GOODYEAR BAR, CAL.

LOCATION.—In the W. ½ SW. ¼ sec. 5, T. 19 N., R. 10 E., at trail bridge in Tahoe National Forest, 300 feet above junction with North Fork of Yuba River, and half a mile north of Goodyear Bar, Sierra County.

DRAINAGE AREA.—12.2 square miles.

RECORDS AVAILABLE.—October 30, 1910, to September 30, 1915.

GAGE.—Vertical staff fastened to an alder tree on left bank 200 feet above bridge; read once a day by G. E. King.

Digitized by Google

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Solid rock and gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.2 feet at 3 p. m., May 11 (discharge, computed from extension of rating curve, 695 second-feet); minimum stage recorded, 1.25 feet from October 1 to 8 (discharge, 2 second-feet).

1910–1915: Maximum stage recorded, 7.0 feet at 3 p. m. December 31, 1913 (discharge, 1,460 second-feet, computed from extension of rating curve and may be subject to error); minimum stage recorded, 1.25 feet from August 14 to October 8, 1914 (discharge, 2 second-feet).

DIVERSIONS.—Three small irrigation ditches (total capacity about 7½ second-feet) head above the station.

REGULATION.—None.

ACCURACY.—Results good.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Goodyear Creek at Goodyear Bar, Cal., during the year ending Sept. 30, 1915.

[Made by H. J. Tompkins.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 31	2.21	56	Aug. 30	1.26	4.8
May 16	2.95	151			

Daily discharge, in second-feet, of Goodyear Creek at Goodyear Bar, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.0	2.5	3.2	3.2	270	65	112	87	72	17	8.5	5.6
2	2.0	2.5	4.0	3.2	199	50	125	76	72	a16	8.5	4.6
3	2.0	2.5	7.0	7.0	82	50	153	65	67	14	8.5	4.6
4	2.0	2.5	4.0	5.5	65	45	125	a69	62	14	7.0	4.6
5	2.0	2.5	4.0	4.0	45	45	118	a72	52	14	7.0	4.6
6	2.0	2.5	4.0	4.0	40	45	112	76	52	14	7.0	4.6
7	2.0	2.5	4.0	4.0	36	a40	125	76	a46	12	8.5	3.7
8	2.0	2.5	4.0	11	146	40	112	76	a41	12	7.0	3.7
9	2.5	2.5	4.0	7.0	87	40	112	338	35	12	7.0	a3.7
10	2.5	a2.5	4.0	5.5	60	40	112	505	35	12	7.0	3.7
11	2.5	2.5	4.0	4.0	50	40	153	695	35	12	7.0	3.7
12	a2.5	2.5	4.0	5.5	36	40	153	364	a39	12	7.0	3.7
13	a2.5	2.5	4.0	15	32	45	139	238	43	12	5.6	3.7
14	2.5	2.5	3.2	32	32	65	139	187	35	12	5.6	3.7
15	2.5	2.5	3.2	13	28	82	139	172	28	10	5.6	3.7
16	2.5	2.5	3.2	9.0	93	82	a149	151	28	10	5.6	3.7
17	2.5	2.5	3.2	7.0	199	99	a158	203	28	10	5.6	3.7
18	2.5	2.5	3.2	7.0	139	99	168	238	28	10	5.6	3.7
19	21	2.5	3.2	5.5	99	99	183	187	28	10	5.6	3.7
20	4.0	2.5	3.2	5.5	93	99	153	a159	22	8.5	5.6	3.7
21	3.2	2.5	3.2	5.5	76	99	139	131	22	8.5	5.6	3.7
22	3.2	2.5	3.2	a5.5	70	112	125	131	22	8.5	a5.6	4.6
23	3.2	2.5	3.2	a5.5	76	118	112	118	22	8.5	a5.6	4.6
24	3.2	2.5	3.2	5.5	76	118	112	118	22	7.0	a5.6	3.7
25	2.5	2.5	3.2	7.0	70	118	87	a109	22	7.0	a5.6	3.7
26	2.5	2.5	3.2	5.5	65	112	87	a100	a20	7.0	5.6	3.7
27	a2.5	2.5	3.2	28	60	112	112	a92	19	7.0	5.6	3.7
28	2.5	4.0	3.2	54	65	183	125	83	19	7.0	5.6	a3.7
29	2.5	4.0	3.2	50	.....	112	153	83	17	7.0	5.6	a3.7
30	2.5	4.0	3.2	45	.....	112	112	83	14	8.5	5.6	3.7
31	2.5	.....	3.2	54	.....	112	.....	a78	.....	7.0	5.6	.....

a Interpolated.

NOTE.—Discharge determined from two rating curves as follows: Oct. 1 to May 11, fairly well defined below 300 second-feet; May 12 to Sept. 30, well defined below 200 second-feet.

Digitized by Google

Monthly discharge of Goodyear Creek at Goodyear Bar, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	21	2.0	3.11	191	D.
November	4.0	2.5	2.65	158	D.
December	7.0	3.2	3.61	222	C.
January	54	3.2	13.7	842	C.
February	270	28	85.3	4,740	B.
March	183	40	81.2	4,990	B.
April	183	87	130	7,740	B.
May	695	65	166	10,200	C.
June	72	14	34.9	2,080	B.
July	17	7.0	10.5	646	B.
August	8.5	5.6	6.34	390	B.
September	5.6	3.7	3.97	236	B.
The year	695	2.0	44.9	32,400	

BEAR RIVER NEAR COLFAX, CAL.

LOCATION.—In sec. 22, T. 15 N., R. 9 E., at Pacific Gas & Electric Co.'s diversion dam, about half a mile below mouth of Greenhorn River, and 3 miles north of Colfax, Placer County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 1, 1911, to September 30, 1915. Records show flow over dam only.

GAGE.—Staff in three sections on left bank, read twice a day by Hund and Dixon. Section No. 1, vertical, fastened to post in forebay of canal, in line with crest of dam; No. 2, inclined, fastened to tree 50 feet above dam; No. 3, vertical, fastened to stump 4 feet below No. 2. Originally, No. 1 was fastened to an old wall close to No. 2. It was destroyed January 18, 1913. Present section was installed Mar. 3, 1913, upon same post as Pacific Gas & Electric Co.'s gage.[1] May 1 to December 21, 1913, an auxiliary low-water section was read which was on right bank 25 feet above dam. Original datum has been maintained.

DISCHARGE MEASUREMENTS.—Made from car and cable 500 feet above dam or by wading.

CHANNEL AND CONTROL.—Channel composed of shifting gravel-tailings from placer mining. Dam forms part of control but discharge is affected by flow in canal.

EXTREMES OF STAGE.—Maximum stage recorded during year, 8.2 feet at 3.30 p. m. May 11; minimum stage recorded gives no indication of discharge owing to conditions at the dam.

1911–1915: Maximum stage recorded, 8.2 feet at 3.30 p. m. May 11, 1915; minimum discharge recorded, 5 second-feet November 5, 7 and 9, 1912.

DIVERSIONS.—Stored water from South Fork of Yuba River is diverted into this drainage above the station.

REGULATION.—A small amount of storage has been developed above the station.

ACCURACY.—A sufficient number of discharge measurements has not been obtained to define the changes in relation of stage to discharge. The shifting character of the channel at the dam and the regulation of headgates to canal cause frequent changes in the rating curve. No estimates of discharge prepared. To obtain total flow of river, discharge of Bear River canal must be included.

COOPERATION.—Gage-height record furnished by Pacific Gas & Electric Co.

[1] Datum 5.18 feet higher.

Digitized by Google

Discharge measurements of Bear River and canal near Colfax, Cal., during the year ending Sept. 30, 1915.

[Made by Charles Leidl.]

Date.	Discharge at cable above dam.	Discharge wasted from canal above canal gage.	Discharge of canal.	Gage height at dam (left bank).	Discharge over dam.
	Sec.-ft.	*Sec.-ft.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
Dec. 3 [a]	177	0	53	5.65	124
Jan. 28 [b]	574	0	59	5.83	515
Feb. 14 [c]	484	0	21	5.88	462
Apr. 15 [d]	518	0	70	5.52	448

[a] Measured by wading at 100 feet below dam.
[b] Measured by wading at 300 feet below dam.
[c] Measured at cable.
[d] Measured by wading at 150 feet below dam.

Daily gage height, in feet, of Bear River near Colfax, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5.7	5.65	5.55	5.2	7.6	6.3	5.8	5.8	5.9	5.3	5.55	5.5
2	5.75	5.5	5.55	5.2	7.75	6.1	5.7	5.75	5.8	5.2	5.5	5.45
3	5.65	5.7	5.7	5.25	6.7	5.95	5.7	5.5	5.7	5.05	5.5	5.45
4	5.6	5.75	5.6	5.5	6.55	5.95	5.75	5.4	5.8	5.1	5.45	5.5
5	5.75	5.55	5.65	5.45	6.1	5.85	5.7	5.4	5.75	5.1	5.45	5.5
6	5.75	5.65	5.7	5.55	5.85	5.8	5.7	5.35	5.75	5.15	5.45	5.5
7	5.7	5.6	5.75	5.6	5.8	5.7	5.9	5.45	5.7	5.25	5.5	5.55
8	5.65	5.55	5.55	5.75	6.85	5.7	5.25	5.35	5.65	5.4	5.45	5.55
9	5.6	5.6	5.6	5.7	7.05	5.65	5.45	5.95	5.65	5.45	5.5	5.55
10	5.7	5.7	5.65	5.6	6.75	5.6	5.5	6.85	5.7	5.5	5.45	5.5
11	5.45	5.65	5.75	5.5	6.65	5.6	5.4	7.8	5.6	5.45	5.45	5.5
12	5.6	5.65	5.65	5.6	6.25	5.65	5.45	7.7	5.6	5.4	5.45	5.5
13	5.65	5.75	5.6	5.65	6.1	5.65	5.6	7.5	5.6	5.45	5.55	5.5
14	5.6	5.7	5.45	5.65	5.95	5.6	5.4	6.85	5.5	5.35	5.5	5.55
15	5.65	5.65	5.45	5.65	5.8	5.5	5.35	6.85	5.4	4.9	5.5	5.55
16	5.65	5.7	5.5	5.5	6.05	5.5	5.45	6.45	5.35	5.25	5.45	5.4
17	5.55	5.75	5.55	5.45	7.25	5.55	5.55	6.45	5.25	5.3	5.45	5.55
18	5.55	5.7	5.55	5.4	7.0	5.55	5.6	6.5	5.25	5.0	5.45	5.5
19	5.7	5.65	5.5	5.4	6.7	5.6	5.65	6.85	5.2	5.2	5.45	5.5
20	5.75	5.65	5.45	5.3	6.65	5.6	5.65	6.8	5.2	5.05	5.5	5.5
21	5.5	5.7	5.35	5.3	6.3	5.6	5.7	6.7	5.45	5.05	5.45	5.55
22	5.65	5.6	5.4	5.25	6.4	5.75	5.65	6.55	5.25	5.35	5.45	5.45
23	5.65	5.5	5.4	5.05	6.45	5.65	5.6	6.4	5.3	5.4	5.45	5.45
24	5.8	5.5	5.4	5.1	6.45	5.6	5.55	6.25	5.7	5.45	5.5	5.4
25	5.45	5.45	5.3	5.35	6.4	5.6	5.5	6.2	5.7	5.5	5.45	5.45
26	5.6	5.55	5.0	5.4	6.3	5.75	5.55	5.95	5.5	5.5	5.4	5.55
27	5.7	5.5	5.2	5.6	6.2	5.8	5.5	6.05	5.4	5.55	5.4	5.5
28	5.65	5.5	5.1	5.8	6.5	5.85	5.65	6.1	5.45	5.55	5.45	5.55
29	5.75	5.35	5.15	5.7	.....	5.95	5.75	5.9	5.5	5.6	5.45	5.45
30	5.7	5.55	5.05	5.75	.....	5.8	5.8	5.85	5.35	5.55	5.5	5.55
31	5.65	.....	5.1	6.05	.....	5.65	.....	5.75	.....	5.55	5.5	.....

BEAR RIVER AT VAN TRENT, CAL.

LOCATION.—In the SE. ¼ sec. 21, T. 14 N., R. 6 E., below highway bridge at McCourtney crossing, 1 mile below Van Trent, Placer County, and 8 miles northeast of Wheatland.

DRAINAGE AREA.—263 square miles.

RECORDS AVAILABLE.—October 8, 1904, to September 30, 1915.

GAGE.—Staff in five sections on left bank 500 feet below bridge; read once a day by Herman Ernestus.

DISCHARGE MEASUREMENTS.—Made by wading or from cable half a mile below gage.

Digitized by Google

CHANNEL AND CONTROL.—Solid rock, boulders and gravel. Shifts during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.6 feet at 9 a. m. February 2 (discharge, 12,700 second-feet); minimum stage recorded, 0.25 foot at 7 a. m. July 21 (discharge, 34 second-feet).

1904–1915: Maximum stage recorded, 18.9 feet at 8 a. m. January 14, 1909 (discharge, 29,600 second-feet, computed from extension of rating curve and may be subject to error); minimum stage recorded, 0.8 foot, August 28, 1913 (discharge, 8 second-feet).

DIVERSIONS.—Water is diverted above station for power and irrigation. Stored water from South Fork of Yuba River is diverted into this drainage above the Colfax station.

REGULATION.—A small amount of storage is developed on the headwaters of this stream. Also see information in paragraph above.

ACCURACY.—Results good.

Discharge measurements of Bear River at Van Trent, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 22	H. J. Tompkins.....	1.79	209	May 21	H. J. Tompkins.....	3.22	1,420
Apr. 12	Charles Leidl.....	1.62	548				

Daily discharge, in second feet, of Bear River at Van Trent, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	192	170	180	79	4,800	1,660	845	463	541	288	85	49
2	140	140	102	72	9,880	1,400	775	486	495	242	75	41
3	245	205	355	72	5,500	1,150	742	419	452	256	66	57
4	205	160	192	355	3,200	1,070	775	398	432	200	57	66
5	94	275	390	170	2,460	990	710	398	411	95	66	66
6	192	160	192	260	1,760	880	845	379	372	187	57	57
7	150	218	180	290	1,480	775	775	326	392	242	57	66
8	120	160	218	820	4,270	710	710	360	392	228	57	85
9	120	79	170	660	5,360	648	710	398	354	187	66	95
10	260	218	320	305	5,920	710	590	2,770	337	320	57	161
11	160	230	320	218	3,540	619	648	4,940	320	242	49	95
12	86	205	355	470	2,040	590	619	12,700	304	115	41	200
13	160	260	205	390	1,480	590	710	3,430	304	256	49	137
14	102	245	140	2,200	1,230	590	648	2,640	242	213	66	115
15	120	230	160	710	1,070	648	563	1,950	372	213	75	161
16	160	94	160	390	1,480	679	590	1,660	354	57	57	115
17	205	260	180	290	5,640	648	590	2,040	242	161	57	105
18	150	275	192	260	5,360	679	536	3,310	271	228	66	115
19	245	205	205	218	3,320	648	440	3,430	320	57	57	115
20	320	260	260	180	3,660	648	563	1,950	372	149	49	137
21	275	245	180	170	2,350	619	486	1,580	304	34	57	161
22	86	218	150	150	1,850	648	486	1,220	320	41	66	126
23	192	86	130	140	1,940	679	463	1,060	288	49	57	161
24	205	120	111	120	2,350	710	398	988	271	66	57	149
25	192	102	102	160	1,760	648	563	914	320	66	49	161
26	79	111	94	260	1,400	679	440	741	288	66	57	174
27	205	79	102	290	1,230	648	463	677	304	57	49	126
28	230	150	86	1,830	2,880	845	379	646	115	57	57	174
29	260	140	94	1,550	.....	1,230	419	646	200	85	49	149
30	192	72	86	765	.....	1,150	775	566	242	95	57	187
31	205	.....	94	1,060	.....	1,030	.....	541	.....	66	41	.....

NOTE.—Discharge determined from three rating curves applicable as follows: Oct. 1 to Feb. 2, fairly well defined between 160 and 4,000 second-feet; Feb. 3 to May 12, fairly well defined below 3,000 second-feet; May 13 to Sept. 30, fairly well defined below 5,000 second-feet.

Digitized by Google

Monthly discharge of Bear River at Van Trent, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	320	79	179	11,000	B.
November	275	72	179	10,700	B.
December	390	86	184	11,300	B.
January	2,200	72	481	29,600	B.
February	9,880	1,070	3,190	177,000	C.
March	1,660	590	813	50,000	B.
April	845	379	609	36,200	B.
May	12,700	326	1,740	107,000	C.
June	541	115	331	19,700	B.
July	320	34	149	9,160	B.
August	85	41	58.2	3,580	B.
September	200	41	120	7,140	B.
The year	12,700	34	653	472,000	

BEAR RIVER CANAL NEAR COLFAX, CAL.

LOCATION.—In sec. 22, T. 15 N., R. 9 E., 750 feet below headgate at diversion dam on Bear River, about 3 miles north of Colfax, Placer County.

RECORDS AVAILABLE.—January 1, 1912, to September 30, 1915.

GAGE.—Float in stilling box on right side of flume about 40 feet below spillway.

DISCHARGE MEASUREMENTS.—Made from foot plank across flume at gage.

COOPERATION.—Daily-discharge record furnished by Pacific Gas & Electric Co.

The water is used for power near Auburn. There are waste gates in the canal about a mile below the diversion dam through which water is sometimes returned to the river.

Discharge measurements of Bear River canal near Colfax, Cal., during the year ending Sept. 30, 1915.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Dec. 3	1.73	53	Feb. 14	1.02	21
Jan. 28	1.96	59	Apr. 15	2.31	70

Digitized by Google

Daily discharge, in second-feet, of Bear River canal near Colfax, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	70	43	55	56	49	19.7	61	0	81	104	75	76
2	71	42	54	55	49	19.7	61	83	80	104	75	76
3	70	43	56	56	47	19.7	61	82	80	106	75	76
4	71	43	56	56	46	19.4	66	82	81	103	75	76
5	71	43	56	56	45	33	66	84	80	102	75	76
6	71	42	56	56	46	33	66	84	81	102	75	76
7	56	42	56	56	46	33	66	84	82	98	76	77
8	56	43	55	56	46	48	67	82	82	99	76	71
9	56	42	55	54	20	48	74	83	82	102	75	71
10	56	43	56	54	20	48	75	71	81	101	75	71
11	56	55	56	54	19.7	58	82	71	81	101	75	70
12	56	55	56	54	21	59	82	50	81	101	75	70
13	56	55	56	55	24	59	81	45	81	100	75	69
14	56	50	55	47	23	59	84	45	80	101	75	105
15	56	50	54	47	23	70	84	25	80	90	75	105
16	56	50	54	49	23	70	85	24	80	101	75	80
17	56	50	55	49	19.1	69	85	24	82	102	75	116
18	56	50	55	48	22	69	94	24	81	101	75	90
19	56	50	55	48	21	69	96	24	84	101	75	80
20	56	50	55	70	19.7	70	95	24	76	90	75	95
21	56	50	55	70	19.1	70	95	24	74	107	75	85
22	56	49	55	70	19.7	70	95	24	75	106	75	90
23	43	50	55	68	19.7	69	82	24	76	108	76	95
24	43	50	55	68	19.7	68	86	81	78	108	75	80
25	43	55	55	70	19.4	68	86	81	76	109	75	76
26	43	55	55	70	19.1	67	85	81	80	109	76	95
27	43	54	55	70	19.7	67	84	81	77	107	76	80
28	43	55	55	68	20	64	82	81	77	110	75	76
29	43	54	55	67	.....	63	82	81	84	110	76	95
30	42	55	54	64	.....	61	81	81	92	110	76	85
31	42	.....	55	67	.....	61	.....	81	.....	109	76	.....

Monthly discharge of Bear River canal near Colfax, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	71	42	55.0	3,380
November	55	42	48.9	2,910
December	56	54	55.2	3,390
January	70	47	59.0	3,630
February	49	19.1	28.1	1,560
March	70	19.4	54.9	3,380
April	96	61	79.6	4,740
May	84	0	58.4	3,590
June	92	74	80.2	4,770
July	110	90	103	6,330
August	76	75	75.3	4,630
September	116	69	82.8	4,930
The year	116	0	65.3	47,200

NOTE.—Monthly and yearly discharge computed by engineers of the U. S. Geological Survey.

NORTH FORK OF AMERICAN RIVER NEAR COLFAX, CAL.

LOCATION.—In the SW. ¼ sec. 30, T. 14 N., R. 10 E., at bridge on Colfax-Forest Hill road, 150 feet below mouth of Shirttail Canyon Creek, 5 miles southeast of Colfax, Placer County, and 11 miles above junction with the Middle Fork.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 16, 1911, to September 30, 1915.

GAGE.—Vertical staff in two sections read once a day by H. P. Henning. Low-water section bolted to ledge on left bank 30 feet below bridge; high-water section wedged in crevice on right bank 35 feet below bridge. December 18, 1912, to

Digitized by Google

August 16, 1914, a Gurley printing electric water-stage recorder was in operation on the right bank 50 feet below the bridge and at the same datum.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders—tailings from placer mining; shifts during high water. Both banks are high, rocky, wooded, and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.2 feet at 3 p. m. May 11 (discharge, 13,200 second-feet); minimum stage recorded, 2.05 feet October 1, 2, 7, 8, 15 and November 17–20 (discharge, 62 second-feet).

1911–1915: Maximum stage recorded, 16.0 feet during morning of January 1, 1914, determined from high-water mark on gage in recorder well (discharge, 23,000 second-feet, computed from extension of rating curve and may be subject to error); minimum stage recorded, 3.12 feet September 24, 1913 (discharge, 51 second-feet).

DIVERSIONS.—A small ditch on the headwaters of the North Fork diverts water above the station.

REGULATION.—None.

ACCURACY.—Results good.

Discharge measurements of North Fork of American River near Colfax, Cal., during the year ending Sept. 30, 1915.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Dec. 3	2.59	205	Feb. 14	4.02	905
Jan. 28	3.76	814	Apr. 15	5.06	1,700

Daily discharge, in second-feet, of North Fork of American River near Colfax, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	62	115	80	90	4,970	1,310	1,480	1,480	2,660	615	114	74
2	62	110	80	102	5,520	1,160	1,670	1,160	2,540	588	114	74
3	70	105	90	102	2,330	940	2,090	1,080	2,780	560	105	74
4	67	102	210	175	1,480	875	2,330	1,010	2,200	510	105	74
5	67	102	145	145	1,010	875	1,670	940	2,420	510	105	74
6	64	90	210	175	875	875	1,480	1,160	2,200	460	105	74
7	62	80	175	175	750	875	1,480	1,480	2,660	413	105	74
8	62	74	145	325	1,570	842	1,390	1,570	2,780	390	105	74
9	74	74	115	305	2,450	810	1,480	3,440	2,090	368	105	74
10	76	74	210	210	1,980	780	1,570	8,510	2,310	347	105	74
11	72	70	192	160	1,670	750	1,670	13,200	1,800	347	97	74
12	70	70	160	245	1,010	750	1,770	9,140	1,620	326	97	74
13	68	67	145	415	940	780	2,580	5,330	1,620	307	97	74
14	66	67	130	950	875	875	1,570	4,610	1,710	254	89	74
15	62	64	115	745	810	1,080	2,580	3,760	1,540	223	89	74
16	64	64	115	305	1,080	1,230	1,870	3,600	1,450	208	89	74
17	70	62	130	245	4,430	1,480	2,580	4,260	1,370	194	89	74
18	100	62	130	228	2,990	1,480	2,710	3,920	1,290	194	86	74
19	115	62	115	210	2,330	1,480	2,210	3,600	1,220	181	86	74
20	160	62	115	192	2,090	1,480	2,330	3,030	1,220	181	86	74
21	145	64	102	175	1,670	1,480	2,090	2,900	1,140	168	86	74
22	115	64	102	175	1,670	1,670	1,870	2,540	1,140	168	82	71
23	90	64	102	192	1,570	1,670	1,670	2,780	1,070	156	82	71
24	80	64	90	160	1,480	1,770	1,570	2,660	1,000	156	82	71
25	80	64	90	175	1,480	1,670	1,480	2,540	865	145	74	71
26	80	64	90	160	1,310	1,670	1,230	2,660	735	145	74	71
27	78	64	102	210	1,160	1,770	1,010	2,780	705	134	74	71
28	76	70	102	778	1,670	3,140	2,330	2,660	675	134	74	71
29	76	90	102	810	.....	2,450	2,710	2,900	675	124	74	71
30	90	90	90	778	.....	1,670	2,450	2,900	645	114	74	71
31	115	.....	90	950	.....	1,390	.....	2,420	.....	105	74	.....

NOTE.—Discharge determined from three rating curves fairly well defined below 5,000 second-feet, applicable Oct. 1 to Feb. 2, Feb. 3 to May 11, and May 12 to Sept. 30.

Digitized by Google

Monthly discharge of North Fork of American River near Colfax, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	160	62	81.9	5,040	B.
November	115	62	75.8	4,510	B.
December	210	80	125	7,690	B.
January	950	90	325	20,000	B.
February	5,520	750	1,900	106,000	B.
March	3,140	750	1,330	81,800	B.
April	2,710	1,010	1,900	113,000	B.
May	13,200	940	3,420	210,000	B.
June	2,780	645	1,600	95,200	B.
July	615	105	281	17,300	B.
August	114	74	91.1	5,600	B.
September	74	71	73.1	4,350	B.
The year	13,200	62	925	670,000	

AMERICAN RIVER AT FAIROAKS, CAL.

LOCATION.—At highway bridge 1,500 feet northwest of Southern Pacific Co.'s railroad station at Fairoaks Bridge, half a mile southeast of Fairoaks, Sacramento County, and 10 miles below mouth of South Fork.

DRAINAGE AREA.—1,910 square miles.

RECORDS AVAILABLE.—November 3, 1904, to September 30, 1915.

GAGE.—Gurley electric water-stage recorder (Pl. VIII, *B*, p. 246) on right bank 800 feet below bridge, installed January 18, 1914. Previously, several staff gages located at the right abutment of bridge had been used. The same datum has been maintained since station was established.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; shifts slightly during high water.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 15.04 feet at 12.30 a. m., May 12 (discharge, 47,900 second-feet); minimum stage, 2.01 feet from 8 to 10.30 a. m., September 24 (discharge, computed from extension of low-water curve, 25 second-feet).

1907–1915: Maximum stage recorded, 30.4 feet, March 19, 1907 (discharge, 119,000 second-feet); minimum stage recorded, 2.01 feet from 8 to 10.30 a. m., September 24, 1915 (discharge computed from extension of low-water curve, 25 second-feet).

DIVERSIONS.—Water is diverted for irrigation above the station.

REGULATION.—See descriptions of Middle, North, and South forks. Low-water flow partly regulated by power plant at Folsom.

ACCURACY.—Water-stage recorder gave a great deal of trouble from December to April, August and September. It was running only 65 per cent of the year. Discharge for periods when the recorder was not running estimated from Weather Bureau gage heights at Folsom, by use of a relation curve and from a few staff gage readings at this station. Results fair.

Digitized by Google

Discharge measurements of American River at Fairoaks, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 3	Charles Leidl	1.69	149	Apr. 17	Charles Leidl	7.74	13,200
Dec. 5	do	3.08	1,400	June 15	do	6.34	8,200
Jan. 22	H. J. Tompkins	2.68	770	Sept. 10	do	2.54	404
Feb. 13	Charles Leidl	5.06	4,850	11	do	2.22	148
Apr. 16	do	7.04	10,800				

Daily discharge, in second-feet, of American River at Fairoaks, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	200	570	244	a 490	13,200	5,890	5,370	6,690	15,000	3,620	623	216
2	206	602	239	530	23,100	5,370	5,120	5,630	14,200	3,510	581	193
3	195	664	450	610	17,100	3,940	6,690	4,870	12,300	3,510	550	a 198
4	239	646	950	890	8,460	3,720	a 7,420	4,510	10,900	3,300	560	a 203
5	228	554	1,160	890	5,630	3,400	8,140	4,510	10,900	3,000	500	a 208
6	206	482	930	745	3,830	3,100	6,690	4,630	11,600	2,700	510	a 212
7	212	443	727	655	a 6,140	a 2,950	5,370	5,370	12,700	2,420	450	a 217
8	212	408	790	1,550	8,460	2,800	5,370	5,890	13,100	2,140	450	a 222
9	228	436	673	2,530	19,300	2,700	5,630	6,690	12,700	2,140	422	a 227
10	244	373	850	a 1,710	15,000	2,800	5,370	29,300	11,200	2,140	432	232
11	286	373	1,190	890	10,500	2,700	9,120	33,600	10,200	2,050	a 419	200
12	338	387	1,500	1,380	6,150	2,520	8,790	41,800	8,460	2,050	a 405	232
13	352	177	a 1,300	1,100	4,510	2,520	10,200	32,700	7,240	2,050	a 392	216
14	286	286	1,100	6,260	3,940	3,100	8,790	28,400	6,960	1,870	a 378	224
15	239	256	840	2,850	3,400	3,100	a 10,000	24,200	7,240	1,780	365	208
16	228	286	700	1,820	3,620	3,830	11,200	21,500	7,240	1,570	a 365	322
17	250	274	530	1,320	12,000	4,160	12,300	20,100	6,690	1,410	a 365	264
18	274	262	655	1,160	19,300	4,630	12,300	20,600	6,420	1,300	a 365	232
19	292	274	530	990	12,700	4,510	12,700	18,800	6,150	1,200	a 365	293
20	366	280	790	890	10,200	4,870	13,500	15,900	5,630	1,150	a 365	224
21	602	292	530	890	a 8,940	a 4,750	11,200	13,500	5,370	1,080	a 365	208
22	820	298	450	870	a 7,680	4,630	9,800	12,000	5,120	1,020	a 365	240
23	610	298	450	830	6,420	5,890	9,460	12,000	5,120	999	a 365	293
24	498	324	415	790	5,630	6,420	7,530	12,000	4,870	1,050	a 365	124
25	466	310	a 432	790	5,370	6,150	6,690	12,300	4,390	1,020	365	200
26	317	298	450	890	4,630	6,150	6,150	11,200	4,050	921	248	208
27	359	324	a 450	900	4,630	5,890	6,420	12,300	3,830	871	272	232
28	359	324	450	2,380	8,140	8,140	8,790	15,900	3,720	823	232	248
29	359	373	450	3,460	.....	10,900	9,460	15,900	3,830	753	232	216
30	380	366	450	3,100	.....	6,960	9,800	14,200	3,830	687	240	224
31	450	.....	450	3,740	.....	5,630	.....	14,200	.....	654	224	.....

a Interpolated.

NOTE.—Discharge determined from two rating curves as follows: Oct. 1 to Feb. 2, fairly well defined; Feb. 3 to Sept. 30, well defined between 70 and 600 and also between 4,000 and 16,000 second-feet. See remarks under "Accuracy" in station description.

Digitized by Google

Monthly discharge of American River at Fairoaks, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	820	195	332	20,400	A.
November	664	177	375	22,300	A.
December	1,500	239	681	41,900	C.
January	6,260	.....	1,550	95,300	C.
February	23,100	3,400	9,210	512,000	C.
March	10,900	2,520	4,650	286,000	C.
April	13,500	5,120	8,510	506,000	C.
May	41,800	4,510	15,500	953,000	A.
June	15,000	3,720	8,030	478,000	A.
July	3,620	654	1,770	109,000	B.
August	623	224	391	24,000	B.
September	322	124	225	13,400	B.
The year	41,800	124	4,230	3,060,000	

MIDDLE FORK OF AMERICAN RIVER NEAR EAST AUBURN, CAL.

LOCATION.—In the SE. ¼ sec. 6, T. 12 N., R. 9 E., at Mountain Quarry Co.'s plant about 1½ miles above the junction with North Fork of American River and 3½ miles northeast of East Auburn, Placer County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 22, 1911, to September 30, 1915.

GAGE.—Staff in three sections on left bank at pump house, read once a day by H. M. Power.

DISCHARGE MEASUREMENTS.—Made from car and cable 1 mile above gage or by wading.

CHANNEL AND CONTROL.—Composed of gravel and boulders; shifts during high water. Both banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.0 feet at 11.45 p. m. May 11 (discharge, 22,000 second-feet); minimum stage recorded, 1.3 feet October 1 to 6 (discharge, 58 second-feet).

1911–1915: Maximum stage recorded, 18.0 feet at 7 a. m. January 1, 1914 (discharge, 26,400 second-feet); minimum stage recorded, 1.3 feet September 30 to October 6, 1914 (discharge, 58 second-feet).

DIVERSIONS.—Little South Fork ditch takes from Gerle Creek and empties into Pilot Creek drainage. Pilot Creek ditch diverts Pilot Creek for irrigation on Georgetown divide. The former ditch is used to supplement the latter when the flow of Pilot Creek is not sufficient. Its maximum discharge is probably less than 20 second-feet.

REGULATION.—Storage is developed in Loon Lake at the head of Gerle Creek to serve the ditches mentioned in the paragraph above.

ACCURACY.—Results good. There were two shifts in the control during the year, but the rating curves are fairly well defined.

The following discharge measurement was made by Charles Leidl:

January 29, 1915: Gage height, 3.93; discharge, 1,220 second-feet.

Digitized by Google

Daily discharge, in second-feet, of Middle Fork of American River near East Auburn, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	58	79	108	180	6,760	5,350	3,730	5,200	5,200	890	266	118
2	58	79	108	180	9,770	5,350	3,870	5,650	5,650	825	266	118
3	58	79	315	180	7,270	5,200	4,300	5,500	5,350	705	266	118
4	58	79	445	445	6,120	5,350	4,150	5,200	5,200	765	266	118
5	58	70	400	445	4,900	5,500	3,600	5,650	5,650	765	266	118
6	58	70	445	445	4,750	5,350	3,210	5,200	5,350	825	230	118
7	63	79	445	495	5,500	5,500	2,850	4,600	4,900	705	230	118
8	63	79	445	495	5,960	5,200	3,210	4,450	5,050	645	198	118
9	63	79	355	495	7,270	5,350	3,090	4,750	4,600	645	198	118
10	63	70	355	600	7,780	5,350	3,470	21,000	4,450	545	266	99
11	79	70	400	600	6,600	5,050	3,730	19,800	4,600	492	266	99
12	70	70	400	600	5,650	5,050	4,450	18,300	4,300	492	230	118
13	70	79	315	715	5,050	4,750	5,200	17,700	3,340	442	230	99
14	70	79	315	3,250	3,730	5,200	4,600	13,600	3,470	348	230	99
15	70	79	315	890	4,900	5,050	4,150	14,800	3,210	394	198	118
16	70	91	278	890	7,610	4,900	4,450	12,200	2,850	394	198	118
17	70	91	445	765	7,960	4,600	4,750	11,700	2,850	348	198	99
18	91	91	400	590	7,270	5,200	4,900	12,000	2,510	394	198	84
19	108	91	400	590	6,930	4,600	5,650	10,900	2,180	348	198	84
20	108	108	355	590	6,440	4,600	5,350	10,900	1,980	348	198	84
21	91	108	355	955	5,650	4,300	5,050	10,300	1,780	348	198	72
22	70	108	355	955	5,200	4,450	5,050	9,400	1,590	348	168	72
23	70	108	355	705	5,350	4,300	5,650	9,040	1,680	306	168	72
24	79	108	315	890	6,120	4,300	5,200	9,040	1,410	306	168	62
25	79	108	242	890	5,200	4,010	5,500	9,040	1,240	306	168	62
26	79	108	242	825	5,500	4,150	5,200	8,860	1,100	266	142	62
27	79	130	278	955	4,900	4,300	5,350	7,440	955	266	142	72
28	70	130	210	1,410	5,200	4,010	5,650	7,100	825	306	142	72
29	70	130	180	1,170	.....	4,010	5,500	6,120	890	306	142	62
30	91	108	180	1,240	.....	3,730	5,500	5,650	890	266	142	62
31	79	.....	180	1,410	.....	3,730	.....	5,200	.....	266	118	.....

NOTE.—Discharge determined from three rating curves as follows: Oct. 1 to Jan. 14, fairly well defined below 7,000 second-feet; Jan. 15 to May 11, well defined below 7,000 second-feet; May 12 to Sept. 30, fairly well defined between 60 and 7,000 second-feet.

Monthly discharge of Middle Fork of American River near East Auburn, Cal., for the year ending Sept. 30, 1915.

Month	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	108	58	73.0	4,490	C.
November	130	70	91.9	5,470	B.
December	445	108	321	19,700	B.
January	3,250	180	801	49,300	B.
February	9,770	3,730	6,120	340,000	A.
March	5,500	3,730	4,770	293,000	A.
April	5,650	2,850	4,550	271,000	A.
May	21,000	4,450	9,560	588,000	A.
June	5,650	825	3,170	189,000	B.
July	890	266	471	29,000	B.
August	266	118	203	12,500	B.
September	118	62	94.4	5,620	B.
The year	21,000	58	2,490	1,810,000	

SOUTH FORK OF AMERICAN RIVER NEAR PLACERVILLE, CAL.

LOCATION.—In the SE. ¼ sec. 26, T. 11 N., R. 10 E., 1,000 feet below bridge at Chilli Bar, on Placerville-Georgetown road, about 1,000 feet below Big Canyon Creek, and 3 miles northwest of Placerville, El Dorado County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 11, 1911, to September 30, 1915.

Digitized by Google

GAGE.—Staff in two sections bolted to solid rock on right bank about 1,000 feet below bridge; high-water section painted on rocks above second section. Gage read once a day by M. M. Riggs.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; appear permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year: 13.50 feet at 7.45 a. m., May 10 (discharge, 7,980 second-feet); minimum stage recorded, 3.50 feet, October 1 and 2 (discharge, 78 second-feet).

1911–1915: Maximum stage recorded, 19.0 feet at 4 p. m., January 25, 1914 (discharge, 15,000 second-feet, computed from extension of rating curve and may be subject to error); minimum stage recorded, 3.28 feet, September 25, 1913 (discharge, 57 second-feet).

DIVERSIONS.—Just below the mouth of Silver Fork there is a diversion for irrigation, mining, and municipal supply for Placerville. Power is developed near mouth of Rock Creek by the Western States Gas & Electric Co. At low water, the entire flow of South Fork of American River is diverted for power. Occasionally the amount is insufficient, and additional water is purchased from the Sierra Water Supply Co. The water diverted for power is returned to the river above gaging station.

REGULATION.—Echo and Silver lakes are used as storage reservoirs.

ACCURACY.—No discharge measurements were made during the year ending September 30, 1915, but a measurement in November, 1915, at gage height 3.9 feet checks the rating curve used since the station was established. Results excellent.

Daily discharge, in second-feet, of South Fork of American River near Placerville, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	78	246	121	162	3,260	1,480	1,890	2,200	6,090	1,820	306	101
2	78	246	128	162	3,840	1,340	2,040	1,960	5,760	1,820	275	121
3	89	356	472	153	2,370	1,220	2,540	1,890	4,770	1,890	393	128
4	89	246	260	322	1,600	1,100	2,720	1,740	4,240	1,680	246	121
5	89	194	393	206	1,340	1,100	2,370	1,740	4,660	1,480	232	114
6	89	162	232	232	1,100	1,040	2,280	1,890	4,990	1,340	219	114
7	95	153	306	246	925	980	2,200	2,120	5,100	1,160	206	108
8	101	144	232	232	1,220	980	2,040	2,200	5,100	1,040	206	108
9	101	144	172	432	3,000	925	2,040	2,540	5,100	1,040	183	101
10	144	144	206	246	2,370	980	2,460	7,980	5,210	980	183	101
11	206	128	393	194	1,890	1,100	2,820	6,780	4,440	980	172	101
12	144	128	260	356	1,410	1,040	3,360	7,740	3,540	1,100	162	101
13	114	128	183	322	1,220	980	3,640	7,620	3,000	1,040	162	108
14	114	121	144	1,680	1,100	1,040	2,720	6,780	3,180	980	153	114
15	114	128	144	730	980	1,160	2,640	4,880	3,640	875	144	114
16	101	128	206	472	1,040	1,340	3,260	5,540	3,540	825	144	114
17	101	128	144	393	2,040	1,480	3,840	5,650	3,180	730	144	108
18	128	121	260	306	3,640	1,600	4,140	5,760	3,180	685	144	101
19	128	114	194	290	2,200	1,600	4,340	4,660	3,080	685	136	101
20	206	114	162	290	2,200	1,680	4,550	4,040	2,720	596	144	95
21	472	108	206	290	1,740	1,820	3,740	3,640	2,640	575	128	95
22	290	108	162	246	1,600	1,890	3,450	3,740	2,720	554	121	89
23	206	108	232	206	1,600	2,040	3,260	4,040	2,720	554	114	114
24	162	108	172	194	1,480	2,120	2,540	3,740	2,460	596	114	95
25	153	108	183	275	1,410	2,120	2,540	3,540	2,200	575	114	95
26	144	108	162	260	1,340	2,120	2,200	3,640	1,890	512	114	114
27	136	108	162	246	1,220	1,890	2,370	4,990	1,820	472	114	101
28	128	114	183	775	1,740	2,040	3,260	5,650	1,890	412	114	101
29	128	128	162	875	.....	2,370	3,180	5,980	1,960	393	108	95
30	162	128	162	875	.....	2,040	2,900	5,320	2,040	356	108	95
31	232	.....	162	980	.....	1,890	.....	5,210	.....	322	101	.....

NOTE.—Discharge determined from a well-defined rating curve.

Digitized by Google

Monthly discharge of South Fork of American River near Placerville, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	472	78	146	8,980	A.
November	356	108	147	8,750	A.
December	472	121	212	13,000	A.
January	1,680	153	408	25,100	A,
February	3,840	925	1,820	101,000	A.
March	2,370	925	1,500	92,200	A.
April	4,550	1,890	2,910	173,000	A.
May	7,980	1,740	4,360	268,000	A.
June	6,090	1,820	3,560	212,000	A.
July	1,820	322	905	55,600	A.
August	393	101	168	10,300	A.
September	128	89	106	6,310	A.
The year	7,980	78	1,350	974,000	

CLEAR LAKE AT LAKEPORT, CAL.

LOCATION.—At municipal wharf on north side of Third Street at Lakeport, Lake County.

RECORDS AVAILABLE.—January 1, 1913, to September 30, 1915.

GAGE.—Vertical staff fastened to piling at municipal wharf; read once a day by A. M. Crump.

EXTREMES OF STAGE.—Maximum stage recorded during year, 10.68 feet February 26; minimum stage recorded, 2.20 feet November 21, 24, and 28.

1913–1915: Maximum stage recorded, 11.12 feet January 28, 1914; minimum stage recorded, 0.62 foot, October 29, 1913.

COOPERATION.—Gage-height record furnished by Yolo Water & Power Co.

Digitized by Google

Daily gage height, in feet, of Clear Lake at Lakeport, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.64	2.40	2.23	2.51	5.70	10.54	9.33	7.75	7.20	5.93	4.74	3.82
2	2.61	2.40	2.25	2.52	7.25	10.46	9.31	7.76	7.15	5.90	4.73	3.80
3	2.59	2.40	2.24	2.54	8.10	10.40	9.30	7.79	7.10	5.86	4.70	3.80
4	2.57	2.38	2.25	2.56	8.42	10.35	9.26	7.80	7.07	5.83	4.68	3.75
5	2.56	2.35	2.25	2.60	8.50	10.25	9.22	7.80	7.00	5.80	4.65	3.72
6	2.54	2.35	2.26	2.70	8.60	10.10	9.18	7.78	7.00	5.78	4.60	3.70
7	2.52	2.35	2.26	2.76	8.75	10.00	9.12	7.76	6.95	5.75	4.58	3.71
8	2.51	2.32	2.30	2.84	9.33	9.95	9.00	7.75	6.93	5.73	4.50	3.72
9	2.50	2.30	2.33	3.03	9.50	9.90	8.98	7.75	6.87	5.63	4.45	3.70
10	2.50	2.32	2.42	3.05	9.90	9.80	8.95	7.73	6.73	5.65	4.40	3.65
11	2.49	2.30	2.45	3.07	10.00	9.70	8.87	7.71	6.77	5.60	4.35	3.60
12	2.50	2.28	2.48	3.10	10.05	9.64	8.80	7.71	6.77	5.60	4.35	3.52
13	2.50	2.22	2.48	3.24	10.10	9.55	8.70	7.68	6.72	5.48	4.30	3.48
14	2.49	2.28	2.49	3.50	10.10	9.48	8.78	7.67	6.65	5.45	4.25	3.50
15	2.49	2.28	2.49	3.50	10.10	9.40	8.75	7.65	6.57	5.35	4.25	3.48
16	2.47	2.22	2.50	3.60	10.20	9.30	8.60	7.65	6.60	5.30	4.20	3.46
17	2.43	2.25	2.50	3.63	10.30	9.22	8.52	7.63	6.53	5.25	4.20	3.44
18	2.47	2.22	2.51	3.64	10.40	9.18	8.48	7.61	6.50	5.22	4.20	3.41
19	2.47	2.23	2.52	3.70	10.40	9.10	8.35	7.60	6.49	5.22	4.20	3.38
20	2.47	2.22	2.54	3.70	10.48	9.00	8.30	7.58	6.47	5.20	4.20	3.38
21	2.47	2.20	2.51	3.70	10.48	8.94	8.28	7.54	6.45	5.18	4.15	3.35
22	2.47	2.22	2.51	3.73	10.50	8.90	8.25	7.51	6.37	5.10	4.12	3.32
23	2.46	2.21	2.50	3.74	10.55	8.83	8.25	7.48	6.29	5.02	4.08	3.30
24	2.48	2.20	2.50	3.76	10.60	8.90	8.20	7.45	6.22	5.00	4.04	3.28
25	2.47	2.22	2.51	3.78	10.64	8.90	8.15	7.43	6.17	4.90	4.00	3.26
26	2.48	2.23	2.50	3.78	10.68	9.00	8.10	7.41	6.10	4.85	4.00	3.25
27	2.45	2.23	2.50	4.00	10.65	9.07	8.10	7.38	6.07	4.80	4.02	3.21
28	2.45	2.20	2.51	4.20	10.60	9.15	7.98	7.35	6.04	4.80	4.00	3.18
29	2.43	2.22	2.51	4.80	.....	9.18	7.90	7.30	6.00	4.78	3.95	3.17
30	2.42	2.23	2.51	5.10	.....	9.23	7.80	7.28	5.96	4.75	3.90	3.15
31	2.40	.....	2.53	5.50	.....	9.28	.....	7.25	.....	4.75	3.85	.....

CACHE CREEK AT LOWER LAKE, CAL.

LOCATION.—In the SE. ¼ SE. ¼ sec. 34, T. 13 N., R. 7 W., above highway bridge near outlet of Clear Lake, about 750 feet above mouth of Seigler Creek, and 1 mile north of Lower Lake, Lake County.

DRAINAGE AREA.—500 square miles.

RECORDS AVAILABLE.—January 1, 1901, to November 14, 1915, when station was discontinued.

GAGE.—Vertical staff on left bank 800 feet above bridge; read once a day by Miss L. T. Anderson.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading. Flow of Seigler Creek is deducted when measurements are made from bridge.

CHANNEL AND CONTROL.—Gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.3 feet February 19 and 24 to 28 (discharge, 3,360 second-feet); minimum stage recorded, 2.25 feet November 30 (discharge, 50 second-feet).

1901–1915: Maximum stage recorded, 13.8 feet February 20, 1909 (discharge, 4,340 second-feet); no flow September 2–14 and 19–30, 1913, and November 18–29, 1914.

DIVERSIONS.—None.

REGULATION.—At low water the channel is sometimes deepened in order to increase the flow from the lake.

ACCURACY.—Results probably excellent, but there is no positive evidence that the rating curve has not changed since the last discharge measurement made November 1, 1914.

Digitized by Google

Discharge measurements of Cache Creek at Lower Lake, Cal., during the period Oct. 1, 1914, to Nov. 19, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1914.		*Feet.*	*Sec.-ft.*	1915.		*Feet.*	*Sec.-ft.*
Oct. 30	R. C. Rice	2.47	71	Nov. 19	H. D. McGlashan	.....	[a]3.0
Nov. 1	....do	2.51	76				

[a] Leakage through temporary dam 300 feet below gage.

Daily discharge, in second-feet, of Cache Creek at Lower Lake, Cal., for the period Oct. 1, 1914, to Nov. 14, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914-15.												
1	95	74	64	85	865	3,290	2,210	900	730	495	320	192
2	91	74	74	85	1,100	3,150	2,150	865	730	495	308	183
3	85	69	74	91	1,230	3,010	2,150	865	700	495	295	183
4	85	69	74	97	1,470	3,010	2,210	865	700	470	295	183
5	85	69	74	91	1,580	2,940	2,090	865	700	470	295	183
6	85	69	74	97	1,580	2,870	1,970	830	700	470	285	175
7	83	64	74	110	1,970	2,730	1,970	830	700	470	275	175
8	80	64	74	167	2,540	2,660	1,850	830	700	470	265	167
9	80	64	85	151	2,730	2,540	1,740	830	700	445	265	167
10	85	64	85	151	2,870	2,540	1,740	830	700	445	265	151
11	80	64	85	167	3,010	2,470	1,740	830	700	445	255	144
12	80	64	85	167	2,940	2,400	1,580	865	670	445	255	151
13	80	64	85	183	2,870	2,400	1,580	865	640	420	255	151
14	76	69	85	200	2,870	2,340	1,420	865	670	420	255	151
15	76	64	83	200	3,150	2,280	1,420	830	640	420	245	151
16	76	64	85	200	3,150	2,150	1,370	830	610	395	235	151
17	80	64	74	200	3,150	2,210	1,320	830	610	395	235	151
18	69	62	85	200	3,150	2,030	1,230	865	610	395	235	137
19	74	62	85	200	3,360	1,970	1,180	830	580	395	235	137
20	74	62	97	217	3,150	1,850	1,140	830	580	395	235	137
21	72	62	97	217	3,010	1,800	1,140	830	580	370	226	151
22	72	62	97	217	3,150	1,800	1,060	795	580	370	217	134
23	72	62	91	217	3,150	1,740	1,060	760	580	370	217	134
24	72	62	85	200	3,360	1,680	980	795	580	370	217	130
25	72	62	85	217	3,360	1,520	980	760	550	370	217	126
26	72	62	91	217	3,360	1,470	980	760	520	345	208	126
27	69	64	91	395	3,360	1,520	980	760	520	345	200	123
28	69	64	91	285	3,360	1,970	900	760	520	345	200	123
29	69	64	95	370	.....	2,090	1,280	730	520	320	200	120
30	69	50	85	395	.....	2,150	980	730	520	320	200	120
31	69	.....	85	470	.....	2,210	.....	730	.....	320	192	.....

Day.	Oct.	Nov.	Day.	Oct.	Nov.	Day.	Oct.	Nov.
1915.								
1	120	87	11	107	91	21	97	.....
2	120	87	12	104	85	22	97	.....
3	110	87	13	104	85	23	97	.....
4	110	85	14	100	85	24	91	.....
5	110	85	15	97	.....	25	91	.....
6	110	87	16	97	.....	26	91	.....
7	110	85	17	97	.....	27	91	.....
8	110	85	18	97	.....	28	91	.....
9	110	95	19	97	.....	29	97	.....
10	110	91	20	97	.....	30	87	.....
						31	91	.....

NOTE.—Discharge determined from a well-defined rating curve. Nov. 15, 1915, Yolo Water & Power Co. built a temporary dam about 300 feet below gage.

Digitized by Google

Monthly discharge of Cache Creek at Lower Lake, Cal., for the period Oct. 1, 1914, to Oct. 31, 1915.

[Drainage area, 500 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1914-15.							
October	95	69	77.3	0.155	0.18	4,750	A.
November	74	50	64.4	.129	.14	3,830	A.
December	97	64	83.7	.167	.19	5,150	A.
January	470	85	202	.404	.47	12,400	A.
February	3,360	865	2,670	5.34	5.56	148,000	A.
March	3,290	1,470	2,280	4.56	5.26	140,000	A.
April	2,210	900	1,480	2.96	3.30	88,100	A.
May	900	730	818	1.64	1.89	50,300	A.
June	730	520	628	1.26	1.41	37,400	A.
July	495	320	410	.820	.95	25,200	A.
August	320	192	245	.490	.56	15,100	A.
September	192	120	150	.300	.34	8,930	A.
The year	3,360	50	746	1.49	20.25	539,000	
1915.							
October	120	87	101	.202	.23	6,210	A.

CACHE CREEK AT YOLO, CAL.

LOCATION.—At highway bridge half a mile south of Yolo, Yolo County, in Rio Jesus Maria grant, 1,000 feet above Southern Pacific Co.'s railroad bridge.

DRAINAGE AREA.—1,320 square miles.

RECORDS AVAILABLE.—January 1, 1903, to September 30, 1915.

GAGE.—Staff in four sections; read twice a day by Mrs. Cornelia W. Bigelow. Lowest section is vertical and fastened to pile under bridge near left bank. Second section, which is inclined, is on right bank, 30 feet above bridge. Third section, vertical, is fastened to cottonwood tree on right bank 70 feet above bridge. Fourth section, vertical, is fastened to upper end of right abutment. This gage was installed October 2, 1904, at the same datum as the original gage on upstream side of right pier of bridge.

DIDCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Sand and gravel; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and period 1903-1915, 27.3 feet at 5 p. m. February 2, 1915 (discharge, 21,100 second-feet computed from extension of rating curve and is subject to error); no flow for periods in nearly every year.

DIVERSIONS.—Numerous ditches divert water for irrigation above the station.

REGULATION.—See Cache Creek at Lower Lake on page 276.

ACCURACY.—Results good.

Discharge measurements of Cache Creek at Yolo, Cal., during the year ending Sept. 30, 1915.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 27	2.34	451	June 15	2.60	517
Feb. 15	8.05	4,440	Sept. 9	1.02	12
Apr. 11	5.72	2,540			

Digitized by Google

Daily discharge, in second-feet, of Cache Creek at Yolo, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.0	50	83	124	6,970	5,480	4,280	1,510	938	291	120	8.0
2	.0	60	83	124	19,300	5,160	3,960	1,440	938	272	120	8.0
3	.0	60	60	124	13,700	4,840	3,720	1,380	880	272	106	4.6
4	.0	72	60	124	6,290	4,680	3,560	1,440	824	254	92	4.6
5	.0	72	50	138	4,840	4,440	3,480	1,440	824	236	79	56
6	.0	83	40	186	4,040	4,280	3,240	1,380	824	218	68	47
7	.0	83	40	282	3,480	4,040	3,080	1,310	768	236	68	22
8	.0	83	40	476	9,180	3,960	2,920	1,250	714	350	68	15
9	.0	83	50	2,180	15,500	3,880	2,760	1,310	714	350	68	8.0
10	.0	83	50	805	8,160	3,720	2,680	1,720	661	310	56	2.6
11	.0	83	163	565	7,140	3,560	2,520	1,580	636	291	47	1.2
12	.0	65	202	565	5,320	3,480	2,440	1,860	610	254	47	.6
13	.0	50	186	542	5,160	3,400	2,440	1,720	562	207	38	.6
14	.0	50	163	960	4,680	3,240	2,280	1,580	517	183	38	.1
15	.0	50	138	1,240	4,520	3,240	2,210	1,510	474	183	47	.1
16	.0	50	138	855	5,080	3,080	2,140	1,440	432	166	47	.05
17	.0	50	144	610	12,400	3,000	2,070	1,380	390	183	47	.05
18	.0	15	169	520	7,650	2,920	2,000	1,510	370	200	38	.05
19	.0	.0	186	432	6,120	2,760	1,930	1,440	350	200	38	8.0
20	.0	.0	186	391	6,120	2,680	1,860	1,380	350	207	38	8.0
21	22	60	186	350	5,560	2,600	1,860	1,310	350	160	30	8.0
22	31	60	186	331	6,630	2,440	1,790	1,310	330	135	30	22
23	40	60	169	331	6,460	2,360	1,720	1,250	330	135	30	8.0
24	40	60	154	312	6,630	2,280	1,720	1,310	310	135	30	4.6
25	40	72	154	312	6,800	2,210	1,720	1,250	310	120	22	4.6
26	40	72	169	312	6,200	2,140	1,650	1,180	310	141	22	4.6
27	40	72	154	542	5,800	2,210	1,580	1,180	291	183	22	4.6
28	40	72	138	5,780	6,380	7,310	1,580	1,120	291	150	22	8.0
29	40	72	138	8,080	.....	6,290	1,510	1,060	291	135	15	8.0
30	50	72	138	6,120	.....	5,240	1,580	1,060	291	135	15	8.0
31	50	.....	138	3,610	.....	4,840	.....	998	.....	120	15	.....

NOTE.—Discharge determined from two rating curves as follows: Oct. 21 to Feb. 2, fairly well defined; Feb. 3 to Sept. 30, well defined between 40 and 8,000 second-feet. No flow Oct. 1–20, Nov. 19 and 20.

Monthly discharge of Cache Creek at Yolo, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	50	0.0	14.0	861	D.
November	83	.0	60.5	3,600	C.
December	202	40	128	7,870	B.
January	8,080	124	1,200	73,800	B.
February	19,300	3,480	7,360	409,000	C.
March	7,310	2,140	3,730	229,000	A.
April	4,280	1,510	2,410	143,000	A.
May	1,860	998	1,370	84,200	A.
June	938	291	529	31,500	A.
July	350	120	207	12,700	A.
August	120	15	49.1	3,020	B.
September	56	.05	9.16	545	C.
The year	19,300	.0	1,380	999,000	

PUTAH CREEK AT WINTERS, CAL.

LOCATION.—Just below Southern Pacific Co.'s railroad bridge at Winters, Yolo County, in the Rio de los Putos grant.

DRAINAGE AREA.—805 square miles.

RECORDS AVAILABLE.—September 26, 1905, to September 30, 1915.

GAGE.—Staff in five sections on left bank, 600 feet below bridge. An auxiliary vertical staff on right bank is used for low water. The original location and gage datum have been maintained, although several changes in sections have been made.

Digitized by Google

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Sand and gravel; somewhat shifting. Two channels at low water but the left channel usually carries very little water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 30.0 feet at 8 a. m. February 2 (discharge, 40,400 second-feet, computed from extension of rating curve, and may be subject to error); minimum stage recorded, 4.05 feet at 4 p. m. October 1 (discharge, 6 second-feet).

1905–1915: Maximum stage recorded, 39.0 feet December 31, 1913, from flood marks at gage (discharge, 60,000 second-feet, computed from extension of rating curve, and may be subject to error); no flow during part of the years ending September 30, 1913 and 1914.

DIVERSIONS.—There are several small diversions for irrigation above the station.

REGULATION.—None.

ACCURACY.—Changes affecting the rating are fairly well defined by discharge measurements; results fair.

Discharge measurements of Putah Creek at Winters, Cal., during the year ending Sept. 30, 1915.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 26	5.53	355	June 14	5.34	142
Feb. 16	8.65	2,680	Sept. 8	4.82	13
Apr. 10	6.78	745			

Daily discharge, in second-feet, of Putah Creek at Winters, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6	9	13	89	15,900	2,600	2,240	243	305	94	37	22
2	9	9	13	89	39,400	2,230	1,710	284	265	83	36	21
3	9	9	17	89	6,740	1,960	1,550	284	245	83	36	20
4	9	9	27	89	5,530	1,780	1,390	327	225	83	36	20
5	9	9	27	178	3,500	1,690	1,240	327	208	73	35	20
6	9	9	27	272	3,500	1,530	1,090	284	190	73	34	19
7	9	9	68	685	3,000	1,450	1,060	243	190	73	34	18
8	9	9	78	4,760	11,600	1,290	910	264	190	63	34	18
9	9	9	89	2,600	8,650	1,240	770	284	190	63	33	18
10	9	9	164	1,020	6,190	1,240	738	2,330	160	54	32	18
11	9	9	272	570	5,530	1,130	672	2,980	160	54	32	18
12	9	9	474	1,400	4,500	1,060	640	1,800	160	54	32	11
13	9	9	256	2,010	4,000	985	580	1,390	160	45	31	11
14	9	9	164	3,100	3,500	985	525	970	145	45	30	11
15	9	9	124	1,370	3,000	950	525	825	130	45	30	11
16	9	9	124	920	5,200	915	470	660	130	45	30	11
17	9	9	208	610	11,300	880	470	690	130	44	29	11
18	9	9	428	435	5,200	880	445	722	130	44	28	6
19	9	9	428	428	3,800	848	420	755	130	44	28	11
20	9	9	306	386	3,800	815	396	660	118	43	28	11
21	9	9	272	344	2,140	782	372	570	118	42	27	11
22	9	9	224	344	9,430	782	372	510	118	42	26	11
23	9	9	150	306	5,200	750	350	510	118	42	26	11
24	9	9	124	272	5,640	718	350	482	118	41	26	11
25	9	9	124	306	4,100	685	327	455	105	40	25	11
26	9	9	124	306	3,200	718	327	428	105	40	24	11
27	9	9	124	4,100	2,800	718	306	400	105	40	24	11
28	9	9	112	10,200	3,300	11,600	306	375	105	39	24	11
29	9	9	112	12,000	.....	5,530	306	350	94	38	23	11
30	9	13	100	5,420	.....	3,380	284	328	94	38	22	11
31	9	.....	100	3,300	.....	2,800	.....	305	.....	38	22	.....

NOTE.—Discharge determined from six rating curves, most of which are well defined. Discharge, Feb. 5–7 and 12–15, estimated by comparison with record of flow of Cache Creek at Yolo. July 17 to Sept. 6 discharge estimated, owing to shifting of control.

Digitized by Google

Monthly discharge of Putah Creek at Winters, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	9	6	8.9	550	C.
November	13	9	9.1	540	C.
December	474	13	157	9,650	A.
January	12,000	89	1,870	115,000	B.
February	39,400	2,140	6,770	376,000	C.
March	11,600	685	1,770	109,000	A.
April	2,240	284	705	42,000	B.
May	2,980	243	679	41,800	B.
June	305	94	155	9,220	B.
July	94	38	53.1	3,260	C.
August	37	22	29.5	1,810	D.
September	22	6	13.9	827	C.
The year	39,400	6	980	710,000	

EEL RIVER BASIN.

EEL RIVER AT SCOTIA, CAL.

LOCATION.—In sec. 18, T. 1 N., R. 1 E., at Wildwood bridge, about one-half mile northeast of Scotia, Humboldt County. Laribee Creek enters about 14 miles above and Van Duzen River 7 miles below the station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 15, 1910, to February 6, 1915.

GAGE.—Staff in five sections read twice a day by A. Scatena. Section No. 1, inclined, on left bank under bridge; No. 2, vertical, spiked to right bank bridge pier; No. 3, vertical, spiked to left bank bridge pier, downstream side; No. 4, vertical, spiked to pile of left bank approach to bridge, 60 feet back of No. 3; No. 5, vertical, spiked to a small redwood tree. The gage as originally installed did not read below 10 feet. It was located at about the present location, but the bridge had not been built and the place was called Wildwood Ferry. A low-water section was installed and washed out several times. All sections were placed in their present positions October 13, 1914, the bridge having been completed shortly before. The datum has never been changed. The lowest sections of gage washed out February 7, 1915.

DISCHARGE MEASUREMENTS.—Formerly made from ferry boat or by wading; now made from bridge.

CHANNEL AND CONTROL.—Solid rock and gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 55.5 feet at 8 a. m., February 2 (discharge, 290,000 second-feet, computed from extension of rating curve and may be subject to error); minimum stage recorded, 9.35 feet at 6 p. m., October 16 (discharge, 200 second-feet).

1911–1915: Maximum stage recorded, 55.5 feet, February 2, 1915 (discharge computed from extension of rating curve, 290,000 second-feet); minimum stage recorded, 9.42 feet, October 5 and 6, 1913 (discharge, 102 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Results good, except for extremely high stages. Rating curve fairly well defined and above 8,000 second-feet it has not changed since the station was established.

Digitized by Google

Discharge measurements of Eel River at Scotia, Cal., during the year ending Sept. 30, 1915.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 14	9.42	219
14	9.42	220

Daily discharge, in second-feet, of Eel River at Scotia, Cal., for the period Oct. 1, 1914, to Feb. 6, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Day.	Oct.	Nov.	Dec.	Jan.	Feb.
1	370	310	2,710	1,060	146,000	16	202	318	4,300	35,600	.....
2	370	306	2,420	1,010	271,000	17	322	306	2,920	27,600	.....
3	360	302	4,550	1,170	164,000	18	350	302	2,320	14,400	.....
4	340	294	10,000	5,340	108,000	19	690	298	2,060	9,650	.....
5	322	290	12,800	11,600	90,400	20	1,290	290	1,970	8,950	.....
6	314	284	15,600	30,600	72,800	21	1,820	287	1,970	8,600	.....
7	306	278	14,800	60,800	.....	22	960	284	1,900	8,300	.....
8	298	272	19,000	81,900	.....	23	564	278	1,820	8,000	.....
9	284	266	22,100	65,600	.....	24	420	275	1,750	8,000	.....
10	275	260	27,600	39,100	.....	25	390	272	1,680	7,700	.....
11	233	260	21,200	37,600	.....	26	365	263	2,420	12,800	.....
12	222	306	12,800	39,100	.....	27	350	260	2,060	53,000	.....
13	214	370	8,600	39,600	.....	28	350	284	1,290	43,700	.....
14	218	425	7,400	79,300	.....	29	330	620	1,170	56,000	.....
15	310	340	5,900	51,400	.....	30	322	1,610	1,120	68,000	.....
						31	314	.....	1,060	79,300	.....

NOTE.—Discharge determined from a fairly well defined rating curve.

Monthly discharge of Eel River at Scotia, Cal., for the period Oct. 1, 1914, to Feb. 6, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1,820	202	431	26,500	C.
November	1,610	260	350	20,800	B.
December	27,600	1,060	7,070	435,000	B.
January	81,900	1,010	32,100	1,970,000	B.
February 1-6	271,000	72,800	142,000	1,690,000	C.
The period	.....	.....	.....	4,140,000	

MIDDLE EEL RIVER NEAR COVELO, CAL.

LOCATION.—In the E. ½ sec. 36, T. 23 N., R. 12 W., near Covelo ranger station, and about 6 miles east of Covelo, Mendocino County. Williams Creek enters about half a mile above the station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 22, 1911, to September 30, 1915.

GAGE.—Staff in two sections on left bank, about one-fourth mile west of ranger station and 1 mile below bridge; read once a day by C. W. Brereton. Several changes in sections have been made, but original location and datum have been maintained.

DISCHARGE MEASUREMENTS.—Made from car and cable, 300 feet above gage.

CHANNEL AND CONTROL.—Small boulders and gravel; fairly permanent.

Digitized by Google

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 25.0 feet at 6 p. m. February 1 (discharge, 26,200 second-feet, determined from extension of rating curve, and is subject to error); minimum stage recorded, 6.9 feet at 8 a. m. September 12 (discharge, 2.5 second-feet).

1911–1915: Maximum stage recorded between 30 and 31 feet at 4.30 p. m. December 31, 1913 (discharge, between 41,500 and 47,100 second-feet). Flood over top of gage and washed out high-water section. Minimum stage recorded, 6.9 feet at 8 a. m. September 12, 1915 (discharge, 2.5 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Results fair.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Middle Eel River near Covelo, Cal., during the year ending Sept. 30, 1915.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 10	8.47	98
10	8.44	94

Daily discharge, in second-feet, of Middle Eel River near Covelo, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	14	59	97	140	26,200	1,930	a3,430	a2,260	2,150	a370	46	18
2	14	59	162	140	6,530	1,820	a3,480	a2,110	2,040	a333	46	18
3	14	59	293	484	a5,770	1,720	3,530	a1,960	1,720	a296	40	15
4	14	51	310	646	a5,010	1,720	4,100	a1,810	1,540	a259	40	15
5	14	44	260	590	4,250	1,620	3,950	a1,660	1,720	a223	40	12
6	14	44	244	1,390	3,120	1,620	3,390	a1,510	a1,720	a187	35	12
7	16	44	293	890	3,950	1,540	3,390	1,360	1,720	151	35	9.7
8	16	38	310	3,810	7,430	1,540	3,390	1,360	1,440	151	35	7.5
9	16	41	260	826	a5,630	1,440	3,250	6,190	1,280	151	35	5.5
10	24	41	293	704	a3,830	1,440	2,990	10,700	1,120	132	30	5.5
11	51	41	260	675	2,040	1,360	2,730	8,330	890	132	30	3.9
12	38	41	229	1,310	1,720	1,540	2,610	4,870	820	115	30	2.5
13	32	41	200	4,250	1,540	1,720	2,610	3,120	750	115	28	a3.5
14	22	51	162	3,950	1,540	2,040	2,490	2,860	685	115	28	a4.5
15	22	44	120	1,470	2,150	2,150	2,370	2,610	685	115	26	a5.5
16	22	44	120	890	2,860	2,610	a2,540	2,150	750	107	26	a6.5
17	51	38	130	826	6,530	2,730	a2,710	a3,120	a710	107	22	7.5
18	104	38	130	826	3,810	2,860	a2,880	4,100	a680	107	22	8.6
19	618	38	140	764	3,390	2,990	a3,050	a3,810	a650	99	22	9.7
20	293	38	140	704	2,730	3,390	a3,220	a3,520	620	92	22	9.7
21	214	38	120	646	2,040	4,100	3,390	a3,230	a589	85	20	9.7
22	140	38	167	536	2,490	3,950	3,390	a2,940	a558	79	20	9.7
23	78	38	158	484	2,730	3,670	3,120	a2,650	a527	73	20	9.7
24	68	27	140	484	2,860	3,530	2,610	2,370	a497	68	20	12
25	59	27	130	484	2,990	3,390	2,150	1,040	a467	63	20	12
26	51	22	136	590	2,370	2,990	2,040	2,150	a437	58	20	12
27	44	27	140	955	2,150	a5,660	1,820	2,730	407	54	20	12
28	41	120	120	2,110	1,930	8,330	2,730	2,730	407	50	20	12
29	38	120	130	3,670	.....	5,190	a2,570	2,610	407	46	20	12
30	38	90	140	4,250	.....	4,100	a2,410	a2,450	407	46	20	12
31	41	.....	144	6,360	.....	3,390	.....	a2,300	.....	46	20	.....

a Interpolated.

NOTE.—Discharge determined from two rating curves applicable as follows: Oct. 1 to Feb. 1, well-defined below 8,000 second-feet; Feb. 2 to Sept. 30, not well defined. Discharge Jan. 1 and 2 estimated by comparison with Eel River at Scotia.

Digitized by Google

Monthly discharge of Middle Eel River near Covelo, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	618	14	71.6	4,400	B.
November	120	22	48.0	2,860	B.
December	310	97	183	11,300	B.
January	6,360	140	1,480	91,000	B.
February	26,200	1,540	4,270	237,000	C.
March	8,330	1,360	2,840	175,000	C.
April	4,100	1,820	2,940	175,000	C.
May	10,700	1,040	3,120	192,000	C.
June	2,150	407	946	56,300	C.
July	370	46	130	7,990	C.
August	46	20	27.7	1,700	C.
September	18	2.5	9.77	581	C.
The year	26,200	2.5	1,320	955,000	

KLAMATH RIVER BASIN.

WILLIAMSON RIVER AT CHILOQUIN, OREG.

LOCATION.—In the NW. ¼ sec. 3, T. 35 S., R. 7 E., at highway bridge about 500 feet above mouth of Sprague River and one-half mile southwest of Chiloquin, Klamath County.

DRAINAGE AREA.—1,260 square miles.

RECORDS AVAILABLE.—July 25, 1911, to September 30, 1915.

GAGE.—Vertical staff on upstream side of right abutment of wagon bridge, except March 29 to July 16, 1915, when a temporary gage on downstream side of abutment was used. Gage read once practically every day up to June 30, 1915, and about twice a week thereafter by United States Indian Service employees.

DISCHARGE MEASUREMENTS.—Made from upstream side of wagon bridge; measuring conditions poor on account of rough bottom and irregular velocities.

CHANNEL AND CONTROL.—Rocks and gravel; practically permanent. A second channel to the left of the main channel always carries some water; banks low and subject to overflow at extremely high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.30 feet March 27 to 31 and April 4 and 6 (discharge, 1,420 second-feet); minimum stage recorded, 3.80 feet August 20, 21, and 30, and September 12 and 16 (discharge, 370 second-feet).

1911–1915: Maximum stage recorded, 6.6 feet April 16, 1913 (discharge, 2,520 second-feet); minimum stage recorded, 3.80 feet August and September, 1915 (discharge, 370 second-feet).

WINTER FLOW.—Stage discharge relation unaffected by ice as most of the water comes from springs.

DIVERSIONS.—Practically none.

REGULATION.—None.

ACCURACY.—Results good.

COOPERATION.—Field data furnished by United States Indian Irrigation Service, H. W. Hincks, project engineer.

Digitized by Google

Discharge measurements of Williamson River at Chiloquin, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 29	F. F. Henshaw	4.25	599	June 27	F. F. Henshaw	4.04	464
Apr. 6	Bostwick and Bullard	5.30	1,450	Aug. 26	N. Bostwick	3.81	372
June 26	F. F. Henshaw	4.07	475				

Daily discharge, in second-feet, of Williamson River at Chiloquin, Oreg., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	510	585	638	585	585	635	1,420	810	610	470	404	375
2	510	635	690	585	545	690	1,420	810	610	470	402	378
3	510	635	690	585	585	635	1,420	810	610	470	406	378
4	510	635	690	585	545	635	1,420	810	610	470	410	378
5	510	635	690	585	545	690	1,420	810	550	470	410	378
6	510	635	690	585	545	690	1,420	810	550	470	409	378
7	510	635	690	585	545	690	1,390	810	550	465	408	378
8	510	635	690	585	545	750	1,350	740	550	465	407	374
9	510	635	690	585	545	750	1,320	740	550	462	406	373
0	510	635	690	585	545	750	1,290	717	550	460	406	372
11	510	635	690	585	545	750	1,260	694	525	455	403	371
12	510	635	690	585	545	750	1,230	670	525	450	400	370
13	510	635	690	585	545	750	1,140	670	525	447	398	372
14	510	635	690	545	545	820	1,140	670	525	445	395	375
15	510	690	690	545	545	820	1,140	670	525	442	392	378
16	510	635	635	545	585	890	1,140	670	525	442	390	370
17	510	635	635	545	585	970	1,140	670	525	442	386	372
18	585	635	635	545	585	1,010	1,140	670	525	442	382	375
19	585	690	635	545	585	1,050	1,050	670	512	442	376	378
20	585	635	610	545	585	1,140	1,050	670	500	437	370	378
21	585	690	585	545	585	1,230	970	670	500	431	370	378
22	585	690	585	545	585	1,320	970	670	500	426	372	378
23	585	690	585	545	585	1,320	970	670	500	430	374	378
24	585	690	585	545	585	1,340	970	670	500	426	378	378
25	585	690	585	545	635	1,370	970	670	500	422	378	378
26	585	690	585	545	635	1,400	970	670	485	418	374	378
27	585	690	585	545	635	1,420	890	610	470	415	373	378
28	585	690	585	585	585	1,420	850	670	470	413	372	378
29	585	638	585	545	.....	1,420	810	610	470	410	371	378
30	585	585	585	545	.....	1,420	810	610	470	408	370	378
31	585	.....	585	545	.....	1,420	.....	610	.....	406	373	.....

NOTE.—Discharge determined from two well-defined rating curves applicable Oct. 1 to Apr. 6 and Apr. 7 to Sept. 30.

Monthly discharge of Williamson River at Chiloquin, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	585	510	544	33,400	B.
November	690	585	650	38,700	B.
December	690	585	641	39,400	B.
January	585	545	563	34,600	B.
February	635	545	572	31,700	B.
March	1,420	635	998	61,400	B.
April	1,420	810	1,150	68,400	B.
May	810	610	701	43,100	B.
June	610	470	527	31,400	A.
July	470	406	443	27,200	A.
August	410	370	389	23,900	A.
September	378	370	376	22,400	A.
The year	1,420	370	629	456,000	

Digitized by Google

UPPER KLAMATH LAKE NEAR KLAMATH FALLS, OREG.

LOCATION.—In sec. 30, T. 38 S., R. 9 E., at the outlet of Upper Klamath Lake, about 2 miles northwest of Klamath Falls, Klamath County.

RECORDS AVAILABLE.—May 28 to October 22, 1904; January 7, 1906, to September 30, 1915.

GAGE.—Friez water-stage recorder since February 16, 1906; vertical staff prior to that date. Zero of gage is 4,136.13 feet above sea level. Observer, Graham Keihl.

EXTREMES OF STAGE.—Maximum stage during year from water-stage recorder, 6.79 feet at 9 p. m. April 29; lowest stage from water-stage recorder, 3.66 feet at 9 p. m. August 15, when a strong south wind held the water back.

FLUCTUATION.—Gage heights are very much affected by the wind. The water is lowered near the outlet when the wind blows from the south and is raised as much above its normal level when the wind is in the opposite direction. There is a periodic oscillation when the wind blows for any length of time.

COOPERATION.—Since May, 1909, this station has been maintained by United States Reclamation Service.

Daily gage height, in feet, of Upper Klamath Lake near Klamath Falls, Oreg., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4.36	4.42	4.91	4.85	5.00	.....	5.50	5.60	5.25	.....	4.05	.....
2	4.36	4.60	5.15	4.85	5.11	.....	5.48	.....	.....	.....	4.06	.....
3	4.50	4.68	5.10	4.85	5.00	5.00	5.60	.....	.....	4.30	.....	4.05
4	4.60	4.66	5.00	4.85	.....	.....	5.80	.....	.....	4.35	.....	4.00
5	4.62	4.72	4.74	4.85	.....	.....	5.78	.....	4.90	.....	.....	4.01
6	4.65	4.85	4.85	4.85	4.96	5.00	5.60	.....	.....	.....	.....	4.05
7	4.65	4.82	4.85	4.86	5.02	5.03	5.64	.....	.....	.....	3.97	4.09
8	4.65	4.84	4.85	4.90	5.02	5.01	.....	4.90	.....	.....	4.04	4.06
9	4.70	4.87	4.85	4.90	5.00	5.05	.....	5.10	.....	.....	4.04	4.10
10	4.65	4.90	4.86	4.90	5.00	5.05	5.60	5.23	.....	4.35	4.07	4.15
11	4.75	4.90	4.85	5.10	5.00	5.05	5.71	5.20	.....	.....	4.10	3.98
12	4.75	4.90	4.80	4.90	5.00	5.04	5.83	.....	4.75	.....	4.10	4.02
13	4.72	.....	4.88	4.90	5.00	5.00	6.14	.....	.....	.....	4.10	3.98
14	4.72	4.85	4.82	4.90	.....	5.06	5.92	.....	4.80	.....	4.10	3.95
15	4.68	4.90	4.82	4.90	.....	5.10	5.68	5.10	4.70	.....	4.03	4.02
16	4.44	4.90	4.84	4.90	.....	5.14	5.60	5.02	.....	.....	4.15	4.00
17	4.60	4.95	4.84	4.90	.....	5.20	5.59	.....	.....	4.20	4.12	3.98
18	4.64	5.00	4.84	4.90	.....	5.20	.....	.....	.....	.....	4.09	4.00
19	4.85	5.00	4.85	4.90	.....	5.20	.....	.....	4.68	.....	4.08	4.02
20	4.88	5.00	4.85	4.85	5.00	5.20	5.80	5.10	4.85	.....	4.03	4.00
21	4.84	4.85	4.85	4.85	5.05	5.20	5.84	5.20	4.75	.....	4.06	4.04
22	4.83	4.80	4.85	4.85	5.05	.....	5.78	5.20	4.70	4.25	4.07	.....
23	4.81	4.82	4.85	4.85	.....	.....	5.65	5.30	4.72	4.19	4.05	.....
24	4.72	4.85	4.85	4.85	.....	.....	5.35	5.30	.....	4.12	4.10	3.80
25	4.75	4.85	4.85	4.85	.....	.....	5.50	.....	.....	.....	4.05	3.92
26	4.76	4.85	4.85	4.85	.....	.....	.....	5.29	4.40	.....	4.02	4.06
27	4.78	4.78	4.85	4.87	5.05	5.20	.....	.....	.....	.....	4.03	4.11
28	4.77	4.72	4.85	4.90	5.05	5.42	5.70	.....	.....	.....	.....	4.10
29	4.76	4.90	4.85	4.90	.....	5.50	6.20	5.15	.....	.....	.....	4.05
30	4.62	4.91	4.85	4.90	.....	5.45	6.12	5.20	.....	.....	4.06	4.03
31	4.36	.....	4.85	4.90	.....	5.53	.....	5.21	.....	4.05	.....	.....

LINK RIVER AT KLAMATH FALLS, OREG.

LOCATION.—In the NW. ¼ sec. 32, T. 38 S., R. 9 E., 500 yards upstream from county bridge over Link River, at Klamath Falls, Klamath County, 1¼ miles below the outlet of Upper Klamath Lake, and immediately above the head of Lake Ewanna.

DRAINAGE AREA.—3,110 square miles.

RECORDS AVAILABLE.—May 15, 1904, to September 30, 1915.

GAGE.—Friez water-stage recorder on left bank, about 500 yards above bridge in NW. ¼ sec. 32; elevation of zero is 4,080.0 feet above sea level. Friez recorder on

Digitized by Google

opposite bank and a little farther upstream was used June 6, 1908, to August 30, 1912. A chain gage on the bridge has been read daily since 1904, and has been used for obtaining the discharge for periods when gage heights are not available for the other gage. Observer, Myrtle Ess.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Rocks and boulders in rapids; clay and sand at bridge. The control for the gage is evidently permanent and water from the tailrace of the California-Oregon Power Co.'s plant, which enters the river opposite the gage, appears to affect gage heights in the same manner as if it came down the river channel. The stage-discharge relation of the chain gage is affected by backwater from Lake Ewanna, especially when the wind is blowing.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 7.29 feet at 12 m. April 29 (discharge, 3,960 second-feet); minimum stage during year and since September, 1912, 4.75 feet at 9 a. m. August 15 (discharge, 655 second-feet).

1904–1916: Maximum stage, 7.30 feet at gage at bridge May 12, 1904, determined May 15, 1904, from high-water marks (discharge, 9,400 second-feet); minimum stage is due to effect of wind on Upper Klamath Lake, and river is said to have gone nearly dry at times.

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSION.—The main or "A" canal of the Klamath project of the United States Reclamation Service diverts from Link River immediately below the lower end of Upper Klamath Lake. For record of this diversion see page —. Some water is also diverted for irrigation from the tributaries to Upper Klamath Lake, but the total run-off is as yet practically unaffected.

REGULATION.—The only artificial regulation is caused by operation of power plant and is small. Marked natural fluctuations are caused by effect of wind on Upper Klamath Lake.

ACCURACY.—Results good.

COOPERATION.—Most of field data furnished by United States Reclamation Service, J. G. Camp, project engineer.

Discharge measurements of Link River at Klamath Falls, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 25	F. F. Henshaw	5.70	1,630	June 9	C. P. Hughes	5.94	1,880
Apr. 9	Humphrey & Hughes	6.74	3,080	July 31	H. W. Humphrey	5.02	825
27	C. P. Hughes	6.59	2,810	Aug. 25	A. R. Leavitt	5.04	911
May 1	do	6.38	2,320				

Digitized by Google

Daily discharge, in second-feet, of Link River at Klamath Falls, Oreg., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,110	1,480	1,660	1,870	2,070	2,210	2,660	2,880	2,140	1,210	885	935
2	1,060	1,560	1,710	1,870	2,210	2,140	2,730	2,660	2,140	1,240	882	930
3	1,110	1,640	1,710	1,870	2,210	2,140	2,880	2,580	2,140	1,230	882	882
4	1,210	1,640	1,690	1,870	2,000	2,210	2,960	2,580	2,140	1,230	889	846
5	1,280	1,710	1,740	1,860	2,000	2,140	3,030	2,500	2,090	1,280	823	890
6	1,280	1,790	1,740	1,870	1,970	2,140	2,880	2,430	2,050	1,210	900	855
7	1,280	1,710	1,740	1,870	1,940	2,140	2,880	2,360	2,000	1,180	910	973
8	1,300	1,660	1,750	1,910	1,960	2,140	2,960	2,280	1,960	1,250	945	906
9	1,250	1,680	1,740	1,910	1,970	2,140	3,030	2,360	1,910	1,280	980	922
10	1,160	1,680	1,880	1,910	1,970	2,140	3,030	2,360	2,280	1,250	962	970
11	1,290	1,660	1,920	1,970	1,970	2,140	3,030	2,500	1,920	1,230	1,000	846
12	1,340	1,580	1,920	1,940	1,970	2,140	3,110	2,580	1,640	1,250	980	880
13	1,380	1,710	1,920	1,940	1,970	2,140	3,350	2,580	1,710	1,230	960	825
14	1,450	1,710	1,920	2,000	1,970	2,070	3,190	2,500	1,660	1,130	922	810
15	1,390	1,740	1,920	2,000	1,970	2,070	3,110	2,580	1,960	1,130	906	903
16	1,330	1,740	1,910	2,000	1,940	2,140	3,030	2,500	1,860	1,130	950	860
17	1,000	1,750	1,900	2,000	1,970	2,210	3,030	2,360	1,770	1,090	972	864
18	1,340	1,740	1,940	1,960	2,000	2,210	2,960	2,430	1,680	1,050	950	860
19	1,180	1,740	1,940	1,940	2,000	2,210	2,960	2,360	1,580	1,060	960	863
20	1,480	1,740	1,940	1,880	2,000	2,280	2,960	2,280	1,480	1,020	886	855
21	1,480	1,740	1,940	1,870	2,000	2,430	3,030	2,430	1,490	1,000	855	886
22	1,580	1,740	1,940	1,900	2,000	2,430	2,960	2,360	1,430	960	810	890
23	1,610	1,740	1,920	1,940	2,000	2,500	2,880	2,280	1,360	920	802	973
24	1,610	1,770	1,920	1,920	2,070	2,580	2,800	2,280	1,450	910	810	1,100
25	1,610	1,770	1,920	1,940	2,070	2,580	2,800	2,280	1,350	1,000	846	940
26	1,600	1,740	1,920	1,910	2,070	2,360	2,880	2,280	1,330	984	855	930
27	1,600	1,350	1,920	1,940	2,070	2,360	2,880	2,280	1,380	907	882	948
28	1,600	1,540	1,920	1,960	2,140	2,500	2,800	2,210	1,350	859	864	982
29	1,600	1,660	1,870	1,970	.....	2,580	3,350	2,210	1,250	795	900	910
30	1,530	1,660	1,870	1,950	.....	2,660	3,190	2,210	1,220	874	1,000	930
31	1,450	.....	1,870	1,940	.....	2,580	.....	2,140	.....	828	855	.....

NOTE.—Discharge determined from a rating curve well defined between 800 and 4,000 second-feet. Discharge, Mar. 28 to Apr. 2, May 2–10, and May 17–21, computed from readings on chain gage at bridge. Discharge, June 1–3, 5–8, and 16–18 interpolated, as recorder was not working. Discharge, July 18 to Aug. 20 and Sept. 1–30, determined by use of discharge integrator; Aug. 21–31, by applying to rating table, one daily reading of gage.

Monthly discharge of Link River at Klamath Falls, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1,610	1,000	1,370	84,200	A.
November	1,770	1,350	1,680	100,000	A.
December	1,940	1,660	1,860	114,000	A.
January	2,000	1,860	1,930	119,000	A.
February	2,210	1,940	2,020	112,000	A.
March	2,660	2,070	2,280	140,000	A.
April	3,350	2,660	2,980	177,000	A.
May	2,880	2,140	2,410	148,000	B.
June	2,280	1,220	1,720	102,000	B.
July	1,280	795	1,090	67,000	A.
August	1,000	802	904	55,600	B.
September	1,100	810	901	53,600	B.
The year	3,350	795	1,760	1,270,000	

Digitized by Google

Total monthly discharge of Link River at Klamath Falls, Oreg., including "A" canal for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1,610	1,000	1,370	84,200	A.
November	1,770	1,350	1,680	100,000	A.
December	1,940	1,660	1,860	114,000	A.
January	2,000	1,860	1,930	119,000	A.
February	2,210	1,940	2,020	112,000	A.
March	2,660	2,070	2,280	140,000	A.
April	3,420	2,660	3,000	179,000	A.
May	2,970	2,300	2,510	154,000	B.
June	2,620	1,510	2,030	121,000	B.
July	1,490	1,120	1,280	78,700	A.
August	1,160	913	1,050	64,600	B.
September	1,150	860	955	56,800	B.
The year	3,420	860	1,830	1,320,000	

KLAMATH RIVER AT SPENCER BRIDGE, NEAR KENO, OREG.

LOCATION.—In sec. 32, T. 39 S., R. 7 E., at highway bridge, about a mile below Spencer Creek, 6 miles below former station at Keno, and 18 miles west of Klamath Falls, Klamath County, on road to Ashland.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 7, 1913, to September 30, 1915. Records at Keno, May 31, 1904, to December 31, 1913, gave results smaller by the small flow contributed by Spencer Creek.

GAGE.—Vertical staff near upstream end of first concrete pier at east end of bridge; read 6 times a week until June 30, 1914, and 3 times a week thereafter. Gage readers, Mattie E. Foster and Bertha Spencer.

DISCHARGE MEASUREMENTS.—Made from upstream side of wagon bridge or by wading at low water. The bridge is supported by bents 20 feet apart, center to center, resting on concrete footings about 2 feet wide and extending above high-water stage. The upstream end of these piers is immediately under the upstream handrail. The meter has generally been suspended from the upstream projection of certain floor beams where velocities have not been influenced by the piers. Measurements by wading have been made just above the bridge.

CHANNEL AND CONTROL.—Heavy gravel and boulders; practically permanent; bed very even.

EXTREMES OF DISCHARGE.—Maximum stage recorded during 1914, 2.42 feet April 21 (discharge, 5,130 second-feet); minimum stage recorded, 0.03 foot September 12 (discharge, 963 second-feet). Maximum stage recorded during 1915, 1.42 feet April 15 (discharge, 3,110 second-feet); minimum stage recorded, −0.10 foot August 10, 21, 26, September 2, 7, 9, 11, and 14 (discharge, 830 second-feet).

1904–1915: Maximum stage recorded at Keno, 15.3 feet about May 10, 1904, from high-water marks observed May 31 (discharge, 9,250 second-feet); minimum stage at Keno, 11.5 feet October 2, 1908 (discharge, 730 second-feet). Stage-discharge relation varied considerably at the Keno station. The lowest discharge obtained as the result of a current-meter measurement was 680 second-feet (stage, 12.0 feet) November 3, 1905.

WINTER FLOW.—Stage-discharge relation not affected by ice.

Digitized by Google

DIVERSIONS.—Only a small quantity of water diverted below Klamath Falls station. At times water finds its way into Lower Klamath Lake through Klamath Straits; at other times the flow is into the river. Much of the winter flow of Lost River is diverted into Klamath River between Klamath Falls and Keno stations. (See p. 309.)

REGULATION.—Some natural regulation is caused by effect of wind on the wide flat stretches of the river above Keno.

ACCURACY.—Results only fair on account of lack of daily readings, diurnal fluctuations, and lack of measurements at highest stages in 1914.

COOPERATION.—Field data furnished by United States Reclamation Service, J. G. Camp, project engineer, Klamath project.

Discharge measurements of Klamath River at Spencer Bridge near Keno, Oreg., during the period Sept. 3, 1913, to Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1913.		*Feet.*	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Sept. 3	Leland Mosier	0.60	1,700	Nov. 7[b]	Henshaw & Mosier	0.69	1,810
Oct. 6	do	.40	1,470				
24	do	.45	1,540	1915.			
				Apr. 12	Humphrey & Hughes	1.32	2,940
1914.				June 17	C. P. Hughes	.72	1 940
Aug. 31[a]	C. E. Maxwell	.11	889	July 31	do	.00	869
Sept. 1[a]	do	.14	862	Sept. 8[b]	H. W. Humphrey	−.10	823
23[a]	do	.11	888	8	A. R. Leavitt	−.10	834

[a] Measurements improperly made and results uncertain.
[b] Measured by wading just above bridge.

Digitized by Google

Daily discharge, in second-feet, of Klamath River at Spencer Bridge, near Keno, Oreg., for the years ending Sept. 30, 1914 and 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	.....	1,560	1,840	2,420	3,390	3,410	4,380	5,000	3,910	.....	1,490	1,140
2	.....	1,560	1,890	2,570	3,290	3,390	4,330	4,920	3,890	2,850	.....	.....
3	.....	1,610	1,860	2,640	3,410	3,430	4,410	4,830	3,770	.....	.....	1,100
4	.....	1,560	1,860	2,710	3,290	3,430	4,490	4,870	3,570	2,980	1,410	.....
5	.....	1,560	1,870	2,800	3,200	3,450	4,570	4,800	3,610	.....	.....	1,180
6	1,410	1,660	1,870	2,780	3,250	3,490	4,530	4,690	3,610	.....	1,340	.....
7	1,440	1,690	1,870	2,780	3,220	3,540	4,530	4,590	3,620	2,710	.....	.....
8	1,440	1,680	1,870	2,820	3,200	3,590	4,590	4,610	3,630	.....	1,340	1,040
9	1,490	1,660	1,870	2,760	3,210	3,610	4,570	4,650	3,630	2,640	.....	.....
10	1,440	1,700	1,890	2,780	3,210	3,630	4,570	4,690	3,580	.....	.....	1,010
11	1,440	1,660	1,890	2,800	3,200	3,710	4,630	4,780	3,530	2,490	1,310	.....
12	1,460	1,660	1,950	2,760	3,200	3,770	4,690	4,290	3,490	.....	.....	963
13	1,470	1,760	1,920	2,710	3,180	3,830	4,630	4,390	3,450	.....	1,280	.....
14	1,450	1,700	1,890	2,760	3,180	3,890	4,720	4,330	3,450	2,350	.....	.....
15	1,440	1,700	1,900	2,750	3,180	3,950	4,650	4,490	3,450	.....	1,230	1,090
16	1,440	1,690	1,890	2,750	3,180	3,970	4,890	4,420	3,450	2,260	.....	.....
17	1,440	1,760	1,860	2,750	3,180	3,950	4,870	4,350	3,430	.....	.....	1,110
18	1,440	1,760	1,890	2,750	3,250	4,010	4,770	4,210	3,410	2,050	1,200	.....
19	1,440	1,740	1,950	2,850	3,270	4,110	4,690	4,290	3,320	.....	.....	1,140
20	1,440	1,750	1,940	2,940	3,270	4,150	4,910	4,250	3,230	.....	1,140	.....
21	1,440	1,720	1,920	2,940	3,270	4,190	5,130	4,250	3,180	2,080	.....	.....
22	1,480	1,760	1,970	3,000	3,270	4,230	5,090	4,210	3,120	.....	1,160	.....
23	1,490	1,810	2,000	3,070	3,270	4,250	5,050	4,180	3,070	1,900	.....	1,140
24	1,480	1,820	2,000	3,020	3,270	4,210	5,050	4,150	3,040	.....	.....	.....
25	1,480	1,840	2,020	2,980	3,270	4,210	5,000	4,190	3,000	1,690	1,160	1,160
26	1,490	1,860	1,970	3,410	3,330	4,390	4,960	4,190	2,960	.....	.....	1,160
27	1,480	1,810	2,020	3,410	3,270	4,350	4,940	3,970	2,930	.....	1,110	.....
28	1,520	1,810	2,050	3,330	3,340	4,320	5,000	4,090	2,920	1,760	.....	.....
29	1,520	1,840	2,020	3,370	.....	4,290	5,000	4,010	2,900	.....	1,110	1,170
30	1,520	1,860	2,120	3,290	.....	4,370	5,050	3,980	2,890	1,550	.....	.....
31	1,550	.....	2,530	3,340	.....	4,310	.....	3,950	.....	.....	.....	.....
1914–15.												
1	1,180	.....	1,700	.....	.....	.....	2,910	3,000	2,350	1,580	.....	.....
2	.....	.....	.....	1,950	2,390	2,240	.....	.....	.....	.....	.....	830
3	1,210	1,700	1,760	.....	.....	.....	3,050	.....	2,350	1,550	974	.....
4	.....	.....	.....	.....	2,080	2,190	.....	2,780	.....	.....	.....	.....
5	.....	1,690	1,800	1,970	.....	.....	.....	.....	2,310	.....	941	.....
6	1,290	.....	.....	.....	2,000	2,280	3,070	2,710	.....	1,450	.....	.....
7	.....	1,840	.....	2,000	.....	.....	.....	.....	.....	.....	930	830
8	1,310	.....	1,720	.....	.....	.....	3,030	2,570	2,170	1,480	.....	.....
9	.....	.....	.....	2,020	1,980	2,300	.....	.....	.....	.....	.....	830
10	1,410	1,840	1,940	.....	.....	.....	3,030	.....	1,900	1,450	830	.....
11	.....	.....	.....	.....	1,980	2,310	.....	2,710	.....	.....	.....	830
12	.....	1,760	.....	2,050	.....	.....	2,930	.....	.....	.....	840	.....
13	1,580	.....	.....	.....	1,980	.....	3,070	2,660	.....	1,330	.....	.....
14	.....	1,840	.....	2,150	.....	.....	.....	.....	.....	.....	.....	830
15	.....	.....	.....	.....	.....	.....	3,110	2,620	2,000	1,340	.....	.....
16	.....	.....	2,120	2,120	2,000	2,300	.....	.....	.....	.....	.....	850
17	1,380	1,840	2,170	.....	.....	.....	3,000	.....	1,860	1,280	930	.....
18	.....	.....	.....	.....	.....	2,530	.....	2,420	.....	.....	.....	.....
19	.....	.....	2,210	2,150	.....	.....	.....	.....	1,810	.....	840	.....
20	1,630	.....	.....	.....	2,020	2,530	2,820	2,460	.....	1,280	.....	.....
21	.....	1,840	.....	2,140	.....	.....	.....	.....	.....	.....	830	850
22	1,690	.....	2,170	.....	.....	.....	2,910	2,460	1,810	1,180	.....	.....
23	.....	.....	.....	2,100	2,100	2,530	.....	.....	.....	.....	930	1,030
24	1,720	1,840	2,080	.....	.....	.....	2,820	.....	1,680	1,100	.....	.....
25	.....	.....	.....	.....	2,100	2,670	.....	2,530	.....	.....	.....	1,030
26	.....	1,840	2,080	2,070	.....	.....	.....	.....	1,680	.....	830	.....
27	1,720	.....	.....	.....	2,120	2,750	2,820	2,260	.....	1,000	.....	.....
28	.....	.....	.....	2,100	.....	.....	.....	.....	.....	.....	930	952
29	1,690	.....	2,120	.....	.....	.....	2,960	2,440	.....	.....	.....	.....
30	.....	.....	.....	2,100	.....	.....	.....	.....	.....	.....	.....	1,000
31	1,690	.....	1,950	.....	.....	2,820	.....	.....	.....	1,040	930	.....

NOTE.—Discharge determined from a well-defined rating curve. Discharge interpolated Sundays from Oct. 6, 1913, to June 5, 1914, and June 6–8, 10, 12, 14–15, 17, 19, 21–22, 24, 26, 28–29, 1914. After July 1, 1914, discharge has been computed only for days on which gage was read. Mean discharge Oct. 1–5, 1913, estimated at 1,450 second-feet.

Digitized by Google

Monthly discharge of Klamath River at Spencer Bridge, near Keno, Oreg., for the years ending Sept. 30, 1914 and 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1913–14.					
October	1,550	1,410	1,460	89,800	B.
November	1,860	1,560	1,720	102,000	B.
December	2,530	1,840	1,950	120,000	B.
January	3,410	2,420	2,900	178,000	B.
February	3,410	3,180	3,250	180,000	B.
March	4,390	3,390	3,920	241,000	B.
April	5,130	4,330	4,750	283,000	B.
May	5,000	3,950	4,410	271,000	B.
June	3,910	2,890	3,370	201,000	B.
July	2,980	1,550	2,250	138,000	B.
August	1,480	1,110	1,250	76,900	B.
September	1,180	963	1,110	66,000	B.
The year	5,130	963	2,690	1,970,000	
1914–15.					
October	1,720	1,180	1,500	92,200	B.
November	1,840	1,690	1,800	107,000	B.
December	2,210	1,700	1,990	122,000	B.
January	2,150	1,950	2,070	127,000	B.
February	2,390	1,980	2,070	115,000	B.
March	2,820	2,190	2,450	151,000	B.
April	3,110	2,820	2,970	177,000	B.
May	3,000	2,260	2,590	159,000	B.
June	2,350	1,680	1,990	118,000	B.
July	1,580	1,000	1,310	80,600	B.
August	974	830	895	55,000	B.
September	1,030	830	897	53,400	B.
The year	3,110	830	1,900	1,360,000	

NOTE.—Monthly discharge July 1, 1914, to Sept. 30, 1915, computed by taking the mean of the daily discharge shown in table of daily discharge.

KLAMATH RIVER NEAR SEIAD VALLEY, CAL.

LOCATION.—In the NE. ¼ sec. 13, T. 46 N., R. 12 W., above highway bridge 300 feet above mouth of Walker Creek, 1¼ miles southeast of Seiad Valley, Siskiyou County, and 11½ miles below mouth of Scott River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 23, 1912, to September 30, 1915.

GAGE.—Staff in five sections fastened to trees on left bank one-fourth mile above highway bridge; read once a day by M. J. Brickley.

DISCHARGE MEASUREMENTS.—Made from car and cable 35 feet below gage.

CHANNEL AND CONTROL.—Gravel and boulders; fairly permanent. Both banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.5 feet at 9 a. m. February 3, discharge(14,600 second-feet, determined from extension of rating curve and may be subject to error); minimum stage recorded, 3.3 feet August 29 to September 23 (discharge, 1,300 second-feet).

1913–1915: Maximum stage recorded, 13.3 feet at 9.30 p. m. December 31, 1913 (discharge, 26,500 second-feet, determined from extension of rating curve and may be subject to error); minimum stage recorded, 3.3 feet August 29 to September 23, 1915 (discharge, 1,300 second-feet).

DIVERSIONS.—Water is diverted from main river and tributaries above the station for use in irrigation, placer mining, and power developments.

REGULATION.—Effect of regulation believed to be small.

ACCURACY.—Results excellent. Rating curve is well defined except for extremely high water.

Digitized by Google

Discharge measurements of Klamath River near Seiad, Cal., during the year ending Sept. 30, 1915.

[Made by H. J. Tompkins.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Sept. 7	3.30	1,290
12	3.30	1,300

Daily discharge, in second-feet, of Klamath River near Seiad Valley, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,890	3,520	2,700	3,020	5,230	4,630	7,940	7,230	6,320	3,350	1,760	1,300
2	1,890	3,520	2,700	3,020	10,800	4,630	8,440	6,770	6,320	3,350	1,760	1,300
3	2,020	3,350	2,860	3,020	14,600	4,630	8,440	6,320	6,100	3,350	1,760	1,300
4	2,020	3,020	2,860	3,020	7,940	4,440	7,940	5,660	6,100	3,350	1,760	1,300
5	2,020	2,860	2,860	3,020	5,660	4,440	8,190	5,660	6,100	3,020	1,640	1,300
6	1,890	2,860	2,860	3,020	5,030	4,440	8,440	5,230	6,100	2,700	1,640	1,300
7	1,890	2,860	2,860	3,180	5,030	4,440	7,940	5,230	6,100	2,860	1,640	1,300
8	2,150	2,860	2,860	3,520	5,030	4,440	7,460	5,440	6,100	2,860	1,520	1,300
9	2,280	2,860	2,860	3,700	9,190	4,440	6,770	5,660	5,660	3,020	1,520	1,300
10	2,280	2,860	3,020	3,520	7,230	4,440	6,540	5,660	5,660	3,020	1,520	1,300
11	2,150	2,860	3,020	3,520	5,030	4,630	6,770	5,660	5,440	2,860	1,520	1,300
12	2,150	2,860	3,020	3,520	5,030	4,630	6,770	5,660	4,830	2,860	1,520	1,300
13	2,280	2,860	3,020	3,880	4,630	4,630	6,770	5,880	4,830	2,550	1,520	1,300
14	2,280	2,860	3,020	3,880	4,440	4,630	6,540	5,880	4,830	2,550	1,410	1,300
15	2,280	2,860	3,020	3,700	4,440	5,230	6,540	5,880	4,630	2,410	1,410	1,300
16	2,410	2,860	3,020	3,520	4,250	5,230	6,540	5,880	4,630	2,410	1,410	1,300
17	2,410	2,860	3,020	3,520	4,830	5,660	6,770	6,100	4,250	2,410	1,410	1,300
18	3,020	2,860	3,020	3,520	5,230	5,660	6,770	6,100	4,250	2,410	1,410	1,300
19	3,350	2,860	3,020	3,350	5,440	5,660	6,770	6,100	4,250	2,410	1,410	1,300
20	3,350	2,860	3,020	3,350	5,230	5,660	7,000	5,660	4,250	2,280	1,410	1,300
21	3,020	2,860	3,020	3,180	5,030	6,100	7,280	5,660	4,250	2,280	1,410	1,300
22	3,020	2,860	3,020	3,180	5,030	6,770	7,230	5,440	4,250	2,280	1,410	1,300
23	2,860	2,860	3,020	3,180	4,630	6,770	6,770	5,660	3,880	2,150	1,410	1,300
24	4,630	2,700	3,020	3,180	4,630	6,540	6,770	5,660	3,700	2,150	1,410	1,410
25	4,630	2,550	3,020	3,180	4,630	6,540	6,770	5,880	3,700	2,150	1,410	1,410
26	4,630	2,550	3,020	3,350	4,630	6,540	6,770	5,880	3,520	2,020	1,410	1,410
27	4,630	2,550	3,020	3,350	4,630	6,540	6,770	5,880	3,520	1,890	1,410	1,410
28	4,440	2,550	3,020	3,520	4,630	7,000	6,770	6,100	3,180	1,890	1,410	1,410
29	4,440	2,700	3,020	3,700	.....	10,800	7,000	6,320	3,180	1,890	1,300	1,410
30	4,440	2,700	3,020	3,700	.....	9,190	7,700	6,320	3,350	1,760	1,300	1,410
31	3,700	.....	3,020	4,250	.....	7,700	.....	6,320	.....	1,760	1,300	.....

NOTE.—Discharge determined from a rating curve well defined below 9,200 second-feet.

Monthly discharge of Klamath River near Seiad Valley, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	4,630	1,890	2,920	180,000	A.
November	3,520	2,550	2,870	171,000	A.
December	3,020	2,700	2,960	182,000	A.
January	4,250	3,020	3,410	210,000	A.
February	14,600	4,250	5,790	322,000	A.
March	10,800	4,440	5,710	351,000	A.
April	8,440	6,540	7,170	427,000	A.
May	7,230	5,230	5,900	363,000	A.
June	6,320	3,180	4,780	284,000	A.
July	3,350	1,760	2,520	155,000	A.
August	1,760	1,300	1,490	91,600	A.
September	1,410	1,300	1,330	79,100	A.
The year	14,600	1,300	3,890	2,820,000	

Digitized by Google

KLAMATH RIVER NEAR REQUA, CAL.

LOCATION.—In sec. 29, T. 13 N., R. 2 E., at Scofield Ferry, about 9 miles above Requa, Del Norte County, and the mouth of the river, and 30 miles below mouth of Trinity River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 25, 1910, to September 30, 1915.

GAGE.—Staff in four sections on right bank at ferry cable; read once a day by Willis McBeth.

DISCHARGE MEASUREMENTS.—Made from car on ferry cable.

CHANNEL AND CONTROL.—Gravel; fairly permanent. Both banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 33.3 feet at 1 p. m. February 2 (discharge, 182,000 second-feet, determined from extension of rating curve and may be subject to error); minimum stage recorded, 5.7 feet September 22, 23, and 28 to 30 (discharge, 3,010 second-feet).

1911–1915: Maximum stage recorded, 33.3 feet at 1 p. m. February 2, 1915 (discharge, determined from extension of rating curve, 182,000 second-feet); minimum stage recorded, 5.3 feet September 23 and 24, 1911 (discharge, 2,440 second-feet).

DIVERSIONS.—Water is diverted for irrigation and power development from main river and tributaries in Oregon and California.

REGULATION.—Effect of regulation believed to be small.

ACCURACY.—Results excellent.

The following discharge measurement was made by Charles Leidl:

October 23, 1914: Gage height, 8.47 feet; discharge, 8,990 second-feet.

Daily discharge, in second-feet, of Klamath River near Requa, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3,380	5,420	9,100	8,200	84,100	29,000	43,300	25,800	33,100	16,000	5,580	3,340
2	3,540	6,200	8,500	9,400	182,000	23,000	42,100	24,800	32,500	15,600	5,340	3,340
3	3,720	6,760	9,100	10,000	80,100	27,400	42,700	24,400	30,700	15,200	5,120	3,340
4	3,720	6,480	11,000	12,400	59,700	23,000	42,700	23,000	29,000	15,200	4,900	3,340
5	3,720	6,200	11,400	14,000	49,200	25,800	41,500	22,600	27,900	14,400	5,120	3,340
6	3,720	5,940	12,400	20,300	43,900	24,800	40,300	22,600	28,400	13,200	4,680	3,340
7	3,540	5,420	12,800	26,800	45,700	24,400	39,100	24,400	30,100	12,400	4,480	3,480
8	3,720	4,940	14,400	45,700	47,100	24,400	44,500	31,300	29,600	12,000	4,480	3,340
9	4,100	4,940	16,800	36,100	51,300	23,900	39,100	36,100	30,100	11,700	4,280	3,220
10	5,180	5,180	14,800	29,000	45,700	23,400	46,400	38,500	30,700	11,400	4,280	3,220
11	7,040	5,180	13,600	31,300	43,900	23,400	47,100	37,300	31,900	11,400	4,280	3,340
12	6,200	5,180	11,700	34,300	37,300	23,400	43,300	36,100	32,500	10,700	4,280	3,220
13	5,180	5,420	10,000	30,700	32,500	25,400	37,900	39,100	27,900	10,700	4,100	3,220
14	5,420	5,180	9,400	40,900	28,400	27,900	35,500	29,000	24,400	10,400	4,100	3,220
15	4,500	5,940	8,800	36,100	27,400	29,000	31,900	23,400	23,000	9,720	3,940	3,220
16	4,940	5,940	8,200	27,900	30,100	30,100	29,000	28,400	22,600	9,400	3,940	3,110
17	5,940	5,420	7,900	22,600	41,500	31,300	32,500	31,300	21,200	8,800	3,940	3,110
18	10,700	5,420	8,200	20,800	39,100	32,500	36,100	38,500	21,200	8,800	3,940	3,110
19	33,700	5,420	7,900	17,600	35,500	33,100	38,500	27,900	20,800	8,500	3,780	3,110
20	22,100	5,420	7,600	16,800	33,700	33,100	36,700	31,900	19,400	8,220	3,780	3,110
21	14,400	5,180	7,320	15,200	32,500	34,300	36,100	33,700	18,500	7,940	3,780	3,110
22	10,700	5,180	7,040	14,400	33,700	37,300	34,900	34,900	18,000	7,660	3,780	3,010
23	8,800	4,940	7,320	13,200	33,700	39,100	33,700	34,300	18,000	7,660	3,620	3,010
24	10,700	4,940	7,900	12,400	33,700	40,900	31,300	34,900	16,800	7,380	3,620	3,110
25	7,320	5,180	9,400	12,000	34,300	43,300	29,600	35,500	15,600	7,380	3,620	3,110
26	7,600	4,940	10,400	11,400	27,900	43,900	29,000	33,100	14,800	6,840	3,620	3,110
27	6,480	5,180	9,100	12,000	32,500	45,100	27,900	33,700	14,000	6,320	3,620	3,110
28	5,940	7,600	8,200	16,000	31,300	51,300	27,400	34,300	14,400	6,320	3,620	3,010
29	5,680	12,000	7,900	20,300	.....	58,300	25,800	35,500	14,800	6,060	3,480	3,010
30	5,420	10,700	7,600	25,800	.....	57,600	26,400	34,300	14,400	5,820	3,480	3,010
31	5,420	.....	7,900	27,900	.....	45,700	.....	33,700	.....	5,820	3,480	.....

NOTE.—Discharge determined from two rating curves well defined below 60,000 second-feet, the change in rating occurring on Feb. 2.

Digitized by Google

Monthly discharge of Klamath River near Requa, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	33,700	3,380	7,500	461,000	A.
November	12,000	4,940	5,930	353,000	A.
December	16,800	7,040	9,800	603,000	A.
January	45,700	8,200	21,700	1,330,000	A.
February	182,000	27,400	46,400	2,580,000	B.
March	58,300	23,000	33,400	2,050,000	A.
April	47,100	25,800	36,400	2,170,000	A.
May	39,100	22,600	31,400	1,930,000	A.
June	33,100	14,000	23,500	1,400,000	A.
July	16,000	5,820	9,970	613,000	A.
August	5,580	3,480	4,130	254,000	A.
September	3,480	3,010	3,190	190,000	A.
The year	182,000	3,010	19,200	13,900,000	

SPRAGUE RIVER NEAR YAINAX, OREG.

LOCATION.—In the NW. ¼ sec. 20,[1] T. 36 S., R. 13 E., about 2 miles above the highway bridge on the road from Yainax to Silver Lake, about 4 miles above mouth of Sycan River, and about 10 miles east of Yainax, Klamath County.

DRAINAGE AREA.—513 square miles.

RECORDS AVAILABLE.—April 19, 1912, to September 30, 1915.

GAGE.—Stevens water-stage recorder on left bank, installed February 20, 1914, at site of vertical staff gage which was read about once a week prior to that date. Observers, engineers of United States Indian Service.

CHANNEL AND CONTROL.—Sand and gravel; no well-defined control, as stream is very sluggish for miles above and below gage; banks subject to overflow at a stage of about 5 feet and considerable water may flow in a cut-off across a bend to the right of the station.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 3.06 feet about 2 p. m., March 30 (discharge, 416 second-feet); minimum stage from water-stage recorder, 0.67 foot August 23 (discharge, 106 second-feet).

1912–1915: Maximum stage recorded, 5.41 feet April 17, 1914 (discharge, 961 second-feet). There was recorded at a station 2 miles downstream, on May 21, 1904, a discharge of 2,080 second-feet). Minimum stage recorded, 0.67 foot August 23, 1915 (discharge, 106 second-feet).

WINTER FLOW.—Stage-discharge relation seldom affected by ice as stream is spring fed.

DIVERSIONS.—Considerable water is diverted near Bly for irrigation.

REGULATION.—None.

ACCURACY.—Results good since water-stage recorder was installed; fair previous to that time.

COOPERATION.—Field data furnished by United States Indian Irrigation Service, H. W. Hincks, project engineer.

[1] Sectional location as published in Water-Supply Paper 331, p. 379, is in error.

Digitized by Google

Discharge measurements of Sprague River near Yainax, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 3	Henshaw and Hincks	1.12	153	Apr. 14	N. Bostwick	2.55	326
Jan. 23	Bostwick and Cunningham	.85	132	July 7	Hincks and Cunningham	1.05	142
Feb. 24	Pearson and Cunningham	1.43	203	Aug. 4	J. J. Hubbell	1.00	139
				31[a]	do	.70	108

[a] Stage-discharge relation may have been slightly affected by growth of weeds in channel.

Daily discharge, in second-feet, of Sprague River near Yainax, Oreg., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	135	156	139	.....	219	219	315	281	288	121	149	109
2	135	156	144	135	255	225	315	268	281	119	141	107
3	144	157	144	.....	294	219	330	274	274	118	138	110
4	140	154	143	.....	262	231	362	268	262	121	138	111
5	138	154	.....	.....	219	243	362	255	255	124	136	112
6	138	155	.....	.....	188	237	337	243	246	128	132	112
7	136	155	.....	.....	181	207	315	231	237	141	126	112
8	137	153	.....	.....	186	181	301	231	225	131	120	113
9	138	154	.....	.....	202	170	294	231	219	132	115	115
10	148	154	.....	.....	188	165	288	288	207	132	113	114
11	149	153	.....	.....	190	166	294	353	201	128	118	114
12	148	155	145	.....	187	168	315	378	201	125	119	118
13	145	156	135	.....	177	179	330	362	201	123	119	121
14	142	157	.....	.....	167	202	330	362	197	126	117	125
15	141	151	.....	.....	164	219	322	362	194	129	118	125
16	140	150	.....	.....	174	243	330	337	188	129	119	123
17	142	151	.....	.....	207	262	337	330	181	130	112	120
18	153	144	.....	.....	262	262	353	330	173	131	112	119
19	164	142	.....	.....	322	274	370	337	169	132	111	118
20	187	140	.....	.....	294	268	387	330	162	134	110	118
21	170	139	.....	.....	237	262	387	315	160	134	109	118
22	163	140	.....	126	202	268	387	308	152	136	107	117
23	160	142	.....	131	193	288	370	301	148	137	107	117
24	158	142	.....	130	188	301	345	322	138	139	109	116
25	158	141	.....	142	196	337	330	345	139	139	110	116
26	157	142	.....	147	202	362	315	345	140	138	109	115
27	155	145	.....	146	207	330	301	337	139	136	109	115
28	155	147	.....	151	213	322	288	322	135	136	108	114
29	154	144	.....	164	.....	337	288	315	127	139	108	114
30	153	138	.....	168	.....	405	288	301	123	142	109	113
31	157	.....	.....	179	.....	362	.....	294	.....	150	108	.....

NOTE.—Discharge determined from rating curves applicable as follows: Oct. 1–19, fairly well defined; Oct. 20 to Mar. 30, fairly well defined; Mar. 31 to Sept. 30, well defined except for September. Discharge, Sept. 21–29, interpolated.

Digitized by Google

Monthly discharge of Sprague River near Yainax, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	187	135	150	9,220	B.
November	157	138	149	8,870	A.
December	.....	.....	a140	8,610	C.
January	.....	.....	a140	8,610	C.
February	322	164	213	11,800	B.
March	405	165	255	15,700	B.
April	387	288	330	19,600	B.
May	378	231	308	18,900	B.
June	288	123	192	11,400	A.
July	150	118	132	8,120	A.
August	149	107	118	7,260	A.
September	125	107	116	6,900	A.
The year	405	107	187	135,000	

a Estimated.

SPRAGUE RIVER AT CHILOQUIN, OREG.

LOCATION.—In the NE. ¼ sec. 3, T. 35 S., R. 7 E., at wagon bridge one-half mile above mouth and the same distance above the Southern Pacific Railroad bridge, where the station was located up to October 31, 1914, half a mile below diversion dam of Modoc Point Canal of United States Indian Office, and about three-fourths mile south of Chiloquin, Klamath County.

DRAINAGE AREA.—1,550 square miles.

RECORDS AVAILABLE.—July 25, 1911, to September 30, 1915.

GAGE.—Vertical staff on downstream end of first bridge pier from right bank; read once daily by employees of United States Indian Service. Chain gage on the railroad bridge was used up to October 31, 1914.

DISCHARGE MEASUREMENTS.—Made from upstream side of wagon bridge. Previous to October 31, 1914, they were made from Southern Pacific Co.'s railroad bridge.

CHANNEL AND CONTROL.—Channel of gravel and boulders; control of large rocks; may shift slightly. There may be slight effect from growth of aquatic plants at low water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.95 feet March 27 (discharge, 1,060 second-feet); minimum stage, 0.22 foot August 11 to 14 (discharge, 236 second-feet); minimum discharge including Modoc Point Canal, 293 second-feet, September 1 to 5.

1911–1915: Maximum stage recorded, 4.0 feet on gage at railroad bridge April 16, 1913 (discharge, 3,350 second-feet); minimum discharge (including Modoc Point Canal), 293 second-feet September 1 to 5, 1915.

WINTER FLOW.—Stage-discharge relation affected by ice only during short periods of extremely cold weather.

DIVERSIONS.—The Modoc Point Canal, completed in 1915, diverted some water around the gage, of which a record was kept. A considerable quantity of water is also diverted for irrigation in the headwaters of Sprague and Sycan rivers.

REGULATION.—Manipulation of sluiceway of diversion dam may cause some fluctuation at the gage.

ACCURACY.—Results good.

COOPERATION.—Field data furnished by United States Indian Irrigation Service, H. W. Hincks, project engineer.

Digitized by Google

Discharge measurements of Sprague River at Chiloquin, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 28	Henshaw and Hincks	0.73	409	June 26	F. F. Henshaw	0.46	289
28	do	.95	522	30	do	.57	338
29	Henshaw & Bostwick	.23	238	30	N. Bostwick	.59	340
29	F. F. Henshaw	.66	385	July 1	do	.25	259
Feb. 3	N. Bostwick	1.08	537	1	do	.33	273
Apr. 6	Bostwick and Bullard	1.85	983				

Daily discharge, in second-feet, of Sprague River at Chiloquin, Oreg., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	378	400	a 422	a 422	460	525	960	a 710	650	248	a 268	250
2	378	400	422	422	500	550	970	700	600	a 248	272	250
3	378	400	380	a 411	550	550	980	675	600	a 248	258	250
4	405	422	422	400	600	550	985	650	550	a 249	256	250
5	405	400	422	422	600	550	960	650	500	a 249	252	250
6	405	400	422	422	575	525	930	650	500	a 250	252	252
7	405	a 400	400	422	500	575	905	625	460	250	252	252
8	405	400	400	422	480	550	880	650	a 453	262	a 251	a 252
9	378	400	400	400	460	500	850	625	a 447	258	250	252
10	378	400	400	400	480	500	790	a 616	440	256	243	252
11	378	400	400	400	500	480	730	a 608	420	256	236	252
12	378	400	400	400	480	480	675	600	420	254	236	a 257
13	378	400	a 400	422	460	500	700	600	420	254	236	262
14	378	422	a 400	400	460	550	a 730	a 638	362	254	236	a 263
15	378	422	400	400	440	575	a 760	675	345	252	a 244	264
16	378	422	400	400	440	600	790	700	a 340	246	252	266
17	378	422	380	400	420	600	790	a 730	a 334	242	250	266
18	405	a 422	400	400	460	a 680	760	760	328	a 242	275	266
19	435	422	422	400	500	760	760	700	345	242	268	264
20	405	400	a 446	400	575	730	760	675	a 340	240	264	264
21	405	400	470	400	625	790	730	675	a 334	240	264	264
22	405	400	422	378	625	915	a 775	700	328	240	a 263	306
23	405	400	400	378	575	985	820	650	310	258	a 261	304
24	405	400	422	b 400	550	a 1,000	820	625	a 310	256	260	303
25	378	a 400	a 422	422	500	a 1,020	a 835	650	310	a 256	254	302
26	350	400	422	420	525	a 1,040	850	625	295	256	254	301
27	405	400	a 434	440	600	1,060	820	a 638	295	256	258	293
28	405	a 411	445	440	525	950	a 775	650	310	256	256	298
29	405	422	422	400	.....	a 950	730	650	328	256	a 256	a 298
30	405	422	422	420	.....	a 950	a 720	a 650	328	a 260	256	298
31	378	.....	422	440	.....	950	.....	a 650	.....	264	252	.....

a Interpolated.

NOTE.—Discharge determined as follows: Oct. 1–31, from gage readings at railroad bridge, by indirect method for shifting channels; Nov. 1 to Jan. 15, from a well-defined rating curve; Jan. 16–21, estimated on account of ice obstruction; Jan. 26 to Sept. 30, from a rating curve well defined above 300 second-feet and fairly well defined below. Discharge estimated Apr. 1–3, 5–8, 10, 11, June 3, Sept. 5, 6, 17–20, and 22–26.

Digitized by Google

Monthly discharge of Sprague River at Chiloquin, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	435	350	392	24,100	B.
November	422	400	407	24,200	A.
December	445	380	414	25,500	A.
January	440	378	410	25,200	B.
February	625	420	517	28,600	A.
March	1,060	480	708	43,500	A.
April	985	675	818	48,700	A.
May	760	600	658	40,400	A.
June	650	295	400	23,800	A.
July	264	240	251	15,400	B.
August	275	236	254	15,600	B.
September	306	250	270	16,100	B.
The year	1,060	236	458	331,000	

Total monthly discharge of Sprague River at Chiloquin, Oreg., including Modoc Point canal, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	435	350	392	24,100	B.
November	422	400	407	24,200	A.
December	445	380	414	25,500	A.
January	440	378	410	25,200	B.
February	625	420	517	28,600	A.
March	1,060	485	713	43,800	A.
April	1,000	690	833	49,600	B.
May	785	625	690	42,400	B.
June	650	327	439	26,100	A.
July	352	316	332	20,400	B.
August	344	295	317	19,500	B.
September	309	293	301	17,900	B.
The year	1,060	293	480	347,000	

SYCAN RIVER NEAR YAINAX, OREG.

LOCATION.—In the NW. ¼ sec. 28, T. 35 S., R. 12 E., about 5 miles by stream above mouth, and about 16 miles northeast of Yainax, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 25, 1911, to September 30, 1915.

GAGE.—Stevens water-stage recorder on left bank. Observers, engineers United States Indian Service. Vertical staff in sec. 3, T. 36 S., R. 12 E., about 3 miles below present gage, was used 1911 to 1913.

DISCHARGE MEASUREMENTS.—Made from cable 15 feet above gage, or by wading.

CHANNEL AND CONTROL.—Stream bed, gravel and sand; heavy growth of aquatic plants in summer; shifting. One channel at all stages; banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 4.89 feet at 12 m. March 21 (discharge, 564 second-feet); minimum stage from water-stage recorder, 0.71 foot September 30 (discharge, 20 second-feet).

1911–1915: Maximum stage recorded, 10.1 feet (old gage) April 13, 1913 (discharge, 1,680 second-feet). River may have reached a higher stage than this, as the gage was destroyed. The minimum discharge for 1915 was probably as low as has been reached for several years. The earlier low-water gage heights are not believed to be wholly reliable.

Digitized by Google

WINTER FLOW.—Stage discharge relation apparently not seriously affected by ice, as most of low-water flow comes from springs.

DIVERSIONS.—Some water is used for irrigation by flooding in Sycan Marsh.

REGULATION.—None.

ACCURACY.—Results good since recorder has been installed.

COOPERATION.—Field data furnished by United States Indian Irrigation Service.

Discharge measurements of Sycan River near Yainax, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 3	Henshaw and Hincks..	0.99	48.6	Aug. 3	J. J. Hubbell.....	1.15	26.7
Jan. 23	Bostwick and Cunningham.....	.60	23.9	19	.....do.....	1.05	24.4
Feb. 26	Bostwick and Pearson..	.86	58.3	Sept. 1	.....do.....	1.00	19.7
Apr. 14	N. Bostwick.....	3.05	254	23	.....do.....	.85	23.0
July 7	Hincks and Cunningham.....	1.43	38.7				

Daily discharge, in second-feet, of Sycan River near Yainax, Oreg., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	June.	July.	Aug.	Sept.
1	49	52	40	25	37	57	271	.....	35	26	21
2	49	52	39	25	38	64	257	.....	34	27	21
3	48	50	37	25	37	68	285	.....	33	28	22
4	48	51	37	25	35	67	374	.....	35	.....	24
5	48	51	36	25	34	64	328	.....	36	.....	24
6	48	51	35	25	34	64	257	.....	37	.....	24
7	49	51	37	25	36	64	229	.....	38	.....	24
8	50	50	36	25	37	62	229	.....	40	.....	25
9	52	50	36	25	37	64	208	.....	40	.....	27
10	53	50	36	25	37	65	180	.....	.....	.....	27
11	52	49	35	25	37	65	167	.....	.....	.....	26
12	55	48	34	25	36	68	167	.....	.....	.....	26
13	55	48	31	25	39	74	190	.....	.....	.....	27
14	55	48	30	25	38	83	250	.....	.....	.....	28
15	52	42	31	25	37	106	229	.....	.....	.....	28
16	52	48	34	25	37	154	.....	.....	.....	.....	26
17	55	49	35	25	43	236	.....	.....	.....	.....	27
18	63	49	30	25	57	328	.....	.....	.....	.....	27
19	65	42	28	26	55	454	.....	.....	.....	24	26
20	67	42	28	26	49	509	.....	.....	.....	25	24
21	64	42	34	26	46	472	.....	.....	30	24	23
22	64	42	27	27	44	454	.....	.....	30	24	24
23	62	43	26	27	44	436	.....	.....	29	24	23
24	58	40	26	27	56	436	.....	.....	28	23	22
25	56	39	26	26	61	400	.....	.....	27	23	22
26	55	41	25	28	62	320	.....	.....	26	23	23
27	53	47	25	28	57	271	.....	.....	26	22	23
28	52	47	24	29	59	278	.....	.....	26	22	22
29	52	40	25	30	.....	358	.....	.....	26	21	22
30	53	38	24	30	.....	271	.....	35	26	21	21
31	52	.....	25	30	.....	250	.....	.....	26	20	.....

NOTE.—Discharge determined as follows: Oct. 1 to Jan. 25, from fairly well-defined rating curve; Jan. 26 to Feb. 23, by indirect method for shifting control; Feb. 24 to Apr. 15, from fairly well-defined rating curve; June 30 to Aug. 20, from well defined rating curve. Aug. 21 to Sept. 30, by indirect method for shifting control, on account of obstruction from aquatic plants. Discharge, Oct. 1, and July 27 to Aug. 2, estimated, and interpolated Oct. 28, Jan. 17–20, July 5. 6, 24, 25. Discharge, July 10–20, estimated 35 second-feet, and Aug. 4–15, 26 second-feet.

Digitized by Google

Monthly discharge of Sycan River near Yainax, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	67	48	54.4	3,340	B.
November	52	38	46.4	2,760	B.
December	40	24	31.4	1,930	B.
January	30	25	26.1	1,600	C.
February	62	34	43.5	2,420	C.
March	509	57	215	13,200	B.
April 1–15	374	167	241	7,170	B.
July	40	26	32.7	2,010	B.
August	28	20	24.7	1,520	B
September	28	21	24.3	1,450	C.

MODOC POINT CANAL NEAR CHILOQUIN, OREG.

LOCATION.—In the SE. ¼ sec. 3, T. 35 S., R. 7 E., at intake about a mile south of Chiloquin, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 14 to September 30, 1915.

GAGE.—Inclined staff painted on left of concrete-lined section, about 100 feet below head gates; installed June 29, 1915; previous to that date readings had been made on gage at bridge one-half mile below.

DISCHARGE MEASUREMENT.—Made by wading.

CHANNEL AND CONTROL.—Earth section of canal begins immediately below gage; bottom width, 10 feet; grade, 2.64 feet per mile. Operation of controlling wasteway about a mile below apparently does not affect stage-discharge relation at intake, but did have a material effect at the gage on the bridge.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 2.90 feet July 10 (discharge, 93 second-feet); no flow at times.

ACCURACY.—Results excellent after regular gage was installed.

COOPERATION.—Field data furnished by United States Indian Irrigation Service, H. W. Hincks, project engineer.

Discharge measurements of Modoc Point canal near Chiloquin, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 26	F. F. Henshaw	[a] 2.00	53.4	June 30	N. Bostwick	2.23	49.0
27	....do	[b] 1.70	53.8	30	....do	1.92	34.8
30	N. Bostwick	.87	60.4	30	....do	2.49	65.0
30	....do	1.30	15.8	Aug. 5	Bostwick and Sargent	2.75	82.1

[a] Reading on gage at bridge, height at regular gage, 2.26 feet. [b] Reading of gage at bridge.

Digitized by Google

Daily discharge, in second-feet, of Modoc Point canal near Chiloquin, Oreg., for the year ending Sept. 30, 1915.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1	0	90	60	43	16	47	90	82	43
2	0	90	60	43	17	47	90	82	43
3	0	90	86	43	18	47	90	43	43
4	.....	90	86	43	19	44	90	43	43
5	.....	90	86	43	20	47	90	43	43
6	.....	90	84	43	21	50	90	43	43
7	.....	90	82	43	22	53	90	43	0
8	.....	90	82	43	23	53	60	43	0
9	.....	90	82	43	24	53	60	43	0
10	.....	93	82	43	25	53	60	43	0
11	.....	90	82	43	26	53	60	43	0
12	.....	90	82	43	27	54	60	43	7
13	0	90	82	43	28	17	60	43	7
14	53	90	82	43	29	0	60	43	7
15	47	90	82	43	30	0	60	43	7
					31	.....	60	43	.....

NOTE.—Discharge July 1 to Sept. 30 determined from a well-defined rating curve applied to readings on gage near intake; June 14–28 discharge computed from readings on gage at bridge and two poorly-defined rating curves. Mean discharge May 1–23 estimated at 25 second-feet and May 24–31 and June 4–12 at 50 second-feet.

Monthly discharge of Modoc Point canal near Chiloquin, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March	.....	.....	[a] 5.0	307	
April	.....	.....	[a] 15.0	893	
May	.....	.....	[a] 31.5	1,940	D.
June	54	0	38.9	2,310	B.
July	93	60	81.4	5,010	A.
August	86	43	63.4	3,900	A.
September	43	0	31.0	1,840	A.
The period	.....	.....	.....	16,200	

[a] Estimated.

WOOD RIVER AT FORT KLAMATH, OREG.

LOCATION.—In sec. 22, T. 33 S., R. 7½ E., at a highway bridge one-fourth mile east of Fort Klamath, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 5, 1911, to September 30, 1915.

GAGE.—Vertical staff attached to bridge; read daily by Mrs. E. A. Page.

DISCHARGE MEASUREMENTS. Made from highway bridge.

CHANNEL AND CONTROL.—Clean gravel overlain with pumice sand, dunes of which may at times be observed moving downstream; likely to shift.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.95 feet March 24–26 (discharge, 370 second-feet); minimum stage recorded, 1.35 feet August 24–31 (discharge, 230 second-feet).

1911 and 1913–1915: Maximum stage recorded, 2.50 feet July 24, 1913 (discharge, 495 second-feet, somewhat uncertain). The lowest stage on record is 0.90 foot January 21–23, 1913 (discharge not computed).

WINTER FLOW.—Stage-discharge relation unaffected by ice, as most of the water comes from copious springs a few miles above.

Digitized by Google

DIVERSIONS.—Considerable water is diverted above station for watering hay lands, mostly in May and June.

REGULATION.—None.

ACCURACY.—Results only fair on account of unstable channel and insufficient measurements. Discharge records have been computed for all gage readings except December 1, 1911, to March 31, 1913, during which period no measurements were made and for which ratings for other periods evidently do not apply.

COOPERATION.—Gage-height records furnished by United States Reclamation Service, and part of discharge measurements by United States Indian Service.

Discharge measurements of Wood River at Fort Klamath, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 1	Bostwick & Henshaw..	1.89	315	June 25	F. F. Henshaw.....	1.47	256
1	do.....	1.90	305	July 31	N. Bostwick.....	1.67	304
Jan. 29	N. Bostwick.....	1.72	298				

Daily discharge, in second-feet, of Wood River at Fort Klamath, Oreg., for the year ending Sept. 30, 1915.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	309	333	321	357	297	285	251	309	240
2	309	345	321	357	297	274	251	309	251
3	309	345	321	357	297	274	251	297	251
4	321	321	321	345	285	262	251	297	262
5	309	321	321	333	274	251	251	297	262
6	309	321	321	333	251	251	251	285	274
7	309	321	309	321	251	251	251	274	285
8	309	321	309	321	251	262	251	274	285
9	297	321	321	321	285	262	240	274	285
10	297	321	321	309	309	262	240	274	297
11	297	321	321	309	285	262	240	262	297
12	297	321	321	309	274	251	240	262	285
13	297	321	333	309	262	251	240	251	285
14	297	321	333	309	262	251	240	251	274
15	297	309	333	309	262	251	240	251	262
16	309	321	333	321	285	251	251	240	262
17	309	321	333	333	274	251	262	240	262
18	309	321	333	321	274	251	262	240	274
19	297	321	345	321	274	251	274	240	274
20	297	321	357	321	274	251	285	240	285
21	297	321	357	321	274	251	285	240	285
22	285	321	357	321	274	251	285	240	297
23	285	321	357	321	274	251	285	240	309
24	285	321	370	321	274	251	285	230	309
25	274	321	370	321	285	251	285	230	309
26	274	321	370	321	285	262	285	230	309
27	285	321	357	309	297	262	285	230	309
28	285	321	357	309	297	262	285	230	309
29	309	.....	357	297	297	262	297	230	309
30	321	.....	357	297	297	251	297	230	262
31	321	.....	345	.....	297	.....	309	230	.....

NOTE.—Discharge determined from a fairly well defined rating curve.

Digitized by Google

Monthly discharge of Wood River at Fort Klamath, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	.....	.....	a 290	17,800	B.
November	.....	.....	a 310	18,400	B.
December	.....	.....	a 300	18,400	B.
January	321	274	300	18,400	B.
February	345	309	323	17,900	B.
March	370	309	338	20,800	B.
April	357	297	322	19,200	B.
May	309	251	280	17,200	A.
June	285	251	257	15,300	A.
July	309	240	265	16,300	A.
August	309	230	256	15,700	A.
September	309	240	282	16,800	A.
The year	370	230	293	212,000	

a Estimated.

FOURMILE CREEK NEAR ODESSA, OREG.

LOCATION.—In the NW. ¼ sec. 9, T. 36 S., R. 5 E., just below the outlet of Fourmile Lake, about 15 miles northwest of Odessa, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 6, 1912, to September 30, 1915.

GAGE.—Stevens water-stage recorder about 500 feet below outlet of lake since October 23, 1914, to replace Barrett & Lawrence recorder used since October 18, 1912. Vertical staff 10 feet below dam was used April 6 to August 8, 1912 Observer, George H. Frey.

DISCHARGE MEASUREMENTS.—Made from a footbridge near gage or by wading.

CHANNEL AND CONTROL.—Heavy, angular boulders; may shift slightly.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.90 feet at 9 p. m. May 29 (discharge, 66 second-feet); no flow at times.

1912–1915: Maximum stage recorded, 2.5 feet about June 8, 1912, on old gage, estimated June 11 from high-water marks (discharge, 99 second-feet).

WINTER FLOW.—Stage-discharge relation probably not affected by ice.

DIVERSIONS.—None.

REGULATION.—None; storage dam has never been operated.

ACCURACY.—Results fair.

Discharge measurements of Fourmile Creek near Odessa, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 23	F. F. Henshaw	1.33	3.0	June 27	R. P. Cowgill	0.92	0.62
June 10	R. P. Cowgill	1.65	20.6				

Digitized by Google

Daily discharge, in second-feet, of Fourmile Creek near Odessa, Oreg., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	2.0	2.2	1.9	5.0	5.0	4.2	42	49	0.6	0.2	0.2
2	.....	2.0	2.4	1.9	8.2	4.6	4.6	42	43	.5	.2	.2
3	.....	.....	2.6	2.0	8.8	3.9	6.5	38	36	.5	.2	.2
4	.....	.....	2.5	2.2	11	5.5	7.0	33	33	.4	.2	.2
5	.....	.....	2.6	2.2	10	5.5	7.6	31	31	.4	.2	.1
6	.....	.....	2.6	2.3	9.4	5.5	7.6	31	28	.4	.2	.1
7	.....	.....	2.7	2.6	8.8	5.0	8.2	30	27	.3	.2	.1
8	.....	.....	2.6	3.4	8.8	4.6	8.2	28	25	.3	.2	.0
9	.....	.....	2.5	3.9	8.8	4.2	8.8	28	24	.3	.2	.....
10	.....	.....	2.4	3.9	8.8	4.2	8.8	33	23	.3	.2	.....
11	.....	.....	2.4	3.7	8.2	3.9	8.8	35	23	.3	.3	.....
12	.....	.....	2.4	5.5	7.0	3.9	10	38	22	.3	.2	.....
13	.....	.....	2.4	7.0	6.5	4.2	12	38	20	.3	.3	.....
14	.....	.....	2.4	8.8	6.0	4.2	14	42	19	.3	.3	.....
15	.....	.....	2.4	8.8	5.5	3.9	14	42	16	.3	.3	.....
16	.....	.....	2.2	8.8	4.6	3.9	14	40	13	.3	.3	.....
17	.....	.....	2.2	8.2	4.6	4.2	16	38	12	.3	.3	.....
18	.....	.....	2.1	7.6	4.6	4.6	18	42	10	.3	.3	.....
19	.....	.....	2.1	6.5	4.2	4.6	22	42	8.2	.3	.3	.....
20	.....	.....	2.1	6.0	4.6	4.2	24	40	7.6	.3	.3	.....
21	.....	.....	2.1	5.5	5.0	4.2	27	42	7.0	.3	.3	.....
22	.....	.....	2.0	5.5	5.0	3.9	28	38	6.0	.3	.3	.....
23	2.7	2.0	1.9	5.0	5.0	3.9	30	38	5.5	.3	.3	.....
24	2.5	2.0	1.9	5.0	5.0	3.9	30	40	4.2	.3	.3	.....
25	2.5	2.0	1.9	3.7	5.0	3.7	30	40	3.5	.3	.3	.....
26	2.3	2.0	1.8	3.5	5.0	3.5	31	40	2.2	.3	.3	.....
27	2.3	1.9	2.0	3.5	5.0	3.5	33	47	.7	.3	.3	.....
28	2.2	2.0	2.0	3.5	5.0	3.5	36	60	.6	.3	.3	.....
29	2.2	2.3	1.9	3.5	.....	3.5	42	64	.6	.3	.3	.....
30	2.1	2.4	1.9	3.4	.....	3.8	43	60	.6	.2	.2	.....
31	1.9	.....	1.9	3.5	.....	4.2	.....	56	.....	.2	.2	.....

NOTE.—Discharge determined from a fairly well defined rating curve. Discharge Oct. 1-22 and Nov. 3-22 estimated at 2.0 second-feet.

Monthly discharge of Fourmile Creek near Odessa, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	.....	.....	2.09	129	C.
November	.....	.....	2.02	120	C.
December	2.7	1.8	2.23	137	B.
January	8.8	1.9	4.61	283	B.
February	11	4.2	6.55	364	B.
March	5.5	3.5	4.23	260	B.
April	43	4.2	18.5	1,100	B.
May	64	28	40.6	2,500	C.
June	49	.6	16.7	994	B.
July	.6	.2	.33	20	C.
August	.3	.2	.26	16	C.
September	.2	.0	.04	2	D.
The year	64	.0	8.18	5,920	

Digitized by Google

"A" CANAL AT KLAMATH FALLS, OREG.

LOCATION.—In the NW. ¼ sec. 29, T. 38 S., R. 9 E., at the head of tunnel, about one-fourth mile below the head gates of the canal and about a mile northwest of Klamath Falls, Klamath County.

RECORDS AVAILABLE.—Irrigation season, 1911 to 1915. Some water was diverted for three or four years prior to 1911, but no record was kept.

GAGE.—Barrett & Lawrence water-stage recorder on right of canal just above weir.

DISCHARGE MEASUREMENTS.—Made from a foot plank just inside lower end of tunnel about one-half mile below gage; rectangular section, 13.5 feet wide.

CHANNEL AND CONTROL.—Trapezoidal weir, 18.15 feet long, with its crest 7.27 feet above bottom of canal, which is a concrete-lined section 13.5 feet wide on the bottom, 12 feet deep, and with side slopes ½ to 1.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.4 feet June 25 (discharge 392 second-feet). This is probably the largest quantity of water ever diverted into the canal. No flow at certain periods.

ACCURACY.—Current-meter measurements made in 1915 check the weir formula, corrected for velocity of approach, up to a depth over weir of 1.75 foot, but shows 3 per cent more water for a depth of 2 feet and 6 per cent more for a depth of 3 feet. Earlier measurements were made using too few sections and they have been discarded. Results for 1913 to 1915 excellent.

COOPERATION.—Data furnished by United States Reclamation Service.

This canal diverts from Link River immediately below outlet of Upper Klamath Lake, in the NE. ¼ sec. 30, T. 38 S., R. 9 E., for irrigating lands east of Klamath River and on both sides of Lost River. Most of the return waters reach Lost River.

Discharge measurements of "A" canal at Klamath Falls, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 19	H. W. Humphrey.....	1.05	62.2	June 2	C. P. Hughes.....	2.10	186
21	C. P. Hughes.....	1.77	141	9	.....do.....	3.05	318
29	.....do.....	1.40	106	30	.....do.....	2.80	296
May 5	.....do.....	1.25	83.0	Aug. 7	H. W. Humphrey.....	1.95	169
18	.....do.....	1.44	102				

Digitized by Google

Daily discharge, in second-feet, of "A" canal at Klamath Falls, Oreg., for the year ending Sept. 30, 1915.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	9	.....	91	165	278	232	50
2	9	.....	94	187	232	262	50
3	9	.....	23	217	187	262	50
4	.....	.....	32	262	187	262	50
5	.....	.....	74	262	187	202	50
6	.....	.....	81	217	131	202	50
7	.....	.....	84	247	119	172	50
8	.....	.....	86	278	119	144	50
9	.....	.....	107	326	119	144	50
10	.....	.....	107	342	119	131	50
11	.....	.....	58	326	113	131	50
12	.....	.....	50	342	119	172	50
13	.....	.....	76	342	119	202	50
14	.....	.....	76	358	119	138	50
15	.....	.....	76	350	119	138	50
16	.....	.....	76	358	119	138	50
17	.....	.....	96	358	125	131	50
18	.....	.....	107	342	151	131	50
19	.....	62	107	358	172	131	50
20	.....	50	138	358	158	131	50
21	.....	50	144	342	172	131	50
22	.....	50	144	342	232	147	50
23	.....	50	144	310	232	129	50
24	.....	50	144	310	278	119	50
25	.....	50	138	392	278	111	50
26	.....	52	131	366	294	111	50
27	.....	62	151	294	310	111	50
28	.....	62	165	270	326	86	50
29	.....	76	165	278	326	81	50
30	.....	96	165	294	326	76	50
31	.....	.....	165	.....	294	58	.....

NOTE.—Discharge determined from a well-defined rating curve.

Monthly discharge of "A" canal at Klamath Falls, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	9	0	0.9	55	B.
November	.....	.....	0	0	
December	.....	.....	0	0	
January	.....	.....	0	0	
February	.....	.....	0	0	
March	.....	.....	0	0	
April	96	0	23.7	1,410	B.
May	165	23	106	6,520	A.
June	392	165	306	18,200	A.
July	326	113	195	12,000	A.
August	262	58	149	9,160	A.
September	50	50	50.0	2,980	B.
The year	392	0	69.6	50,300	

LOST RIVER ABOVE OLENE, OREG.

LOCATION.—In the NW. ¼ sec. 21, T. 39 S., R. 11½ E., at an old ford on Brotherton ranch, about 5 miles east of Olene, in Poe Valley. A small quantity of return water from land irrigated from the "A" canal may enter above the station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 22 to September 30, 1915. The discharge does not differ materially from that recorded at the station at Olene, 1907 to 1912.

Digitized by Google

GAGE.—Vertical staff on right bank; read daily to hundredths by United States Reclamation Service employees.

DISCHARGE MEASUREMENTS.—Made by wading; section rather poor on account of dead water at the sides.

CHANNEL AND CONTROL.—Channel tortuous; control fairly permanent; overhanging willows may affect stage-discharge relation somewhat.

EXTREMES OF DISCHARGE.—Minimum stage recorded, 0.85 foot June 27 and 29, and July 21 (discharge, 62 second-feet). For maximum and minimum, 1904 to 1915, see "Lost River at Wilson Bridge," page 309.

DIVERSIONS.—Some land is irrigated in Yonna Valley, a few miles above the station, and a large area by flooding in Langell Valley.

REGULATION.—None.

ACCURACY.—Results good.

COOPERATION.—Records furnished by United States Reclamation Service.

Discharge measurements of Lost River above Olene, Oreg., durning the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 21	Humphrey and Hughes	0.91	69.0	Aug. 12	A. R. Leavitt	1.10	69.8
21	C. P. Hughes	.84	62.3	24	do	1.11	71.4
July 9	do	1.04	69.9	31	do	1.11	69.9
24	do	.91	62.6				

Daily discharge, in second-feet, of Lost River above Olene, Oreg., for the year ending Sept 30, 1915.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		65	66	74	16		71	69	74
2		65	66	75	17		72	70	74
3		65	66	75	18		73	70	74
4		66	66	74	19		73	72	74
5		66	66	74	20		62	72	73
6		70	66	74	21	63	62	74	73
7		71	68	74	22	65	65	74	73
8		71	68	74	23	65	66	74	73
9		71	66	74	24	65	64	74	73
10		71	66	73	25	66	64	74	73
11		71	67	73	26	62	66	74	73
12		72	67	74	27	62	66	77	74
13		72	70	74	28	62	66	77	73
14		71	70	73	29	62	66	74	73
15		70	69	73	30	65	66	74	73
					31		66	74	

NOTE.—Discharge determined from a fairly well defined rating curve.

Monthly discharge of Lost River above Olene, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
June 21-30	66	62	63.7	1,260	B.
July	73	62	67.9	4,180	B.
August	77	66	70.3	4,320	B.
September	75	73	73.6	4,380	B.
The period				14,100	

Digitized by Google

LOST RIVER AT WILSON BRIDGE, NEAR OLENE, OREG.

LOCATION.—On line between secs. 29 and 30,[a] T. 39 S., R. 10 E., at Wilson Bridge, about one-fourth mile below the diversion dam, and about 4 miles by river below Olene, Klamath County.

RECORDS AVAILABLE.—March 14, 1912, to September 30, 1915.

DRAINAGE AREA.—Not measured.

GAGE.—Vertical staff attached to highway bridge; datum 4,005.18 feet above sea level and 60 feet below datum used in 1912. Gage read daily when water is flowing, by the watchman for the dam.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Gravel and chalk rock, clean and fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 63.4 feet March 20–22 (discharge, 522 second-feet); practically no flow except when total discharge of river exceeds capacity of diversion canal.

1904–1915: Maximum stage recorded, 18.25 feet, mean for February 7, 1907, at Merrill station (discharge, 9,200 second-feet). The maximum stage for Olene station was 13.5 feet early in 1904, determined from high-water marks by John H. Lewis, May 24, 1904 (discharge, from partly developed rating curve, 8,600 second-feet). Minimum stage recorded for natural flow conditions, 4.29 feet June 19, 1911, at Olene (discharge, 58 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—This station is just below the dam at which practically all the discharge of Lost River up to about 500 second-feet is diverted through the diversion canal into Klamath River or into the "G" canal (formerly Griffith lateral) on the east bank of the river.

REGULATION.—Changes in discharge covering several days may be caused at times by operation of the movable crest and outlet gates of the dam.

ACCURACY.—Results good.

COOPERATION.—Field data furnished by United States Reclamation Service.

Dischargee measurements of Lost River at Wilson Bridge near Olene, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 5	F. F. Henshaw	60.29	86.4	Nov. 7[b]	C. E. Maxwell	61.30	200
7[a]	C. E. Maxwell	61.28	189	Apr. 1	H. W. Humphrey	61.35	235

[a] Section location previously published is in error.
[b] Water released at dam to create stage desired for measurement.

Digitized by Google

Daily discharge, in second-feet, of Lost River at Wilson Bridge, near Olene, Oreg., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Mar.	Apr.	Day.	Oct.	Nov.	Dec.	Jan.	Mar.	Apr.
1	.....	86	86	86	.....	188	16	81	86	86	.....	226	.....
2	.....	86	86	86	.....	96	17	86	86	86	.....	296	.....
3	.....	86	86	86	.....	56	18	86	86	86	.....	446	.....
4	.....	86	86	86	.....	0	19	86	86	86	.....	454	.....
5	.....	86	86	86	.....	.....	20	128	86	86	.....	522	.....
6	.....	86	86	86	.....	.....	21	96	86	86	.....	522	.....
7	.....	86	86	86	.....	.....	22	152	86	86	.....	522	.....
8	.....	86	86	86	.....	.....	23	96	86	86	.....	504	.....
9	.....	86	86	86	.....	.....	24	86	86	86	.....	495	.....
10	.....	86	86	0	.....	.....	25	86	86	86	.....	504	.....
11	.....	86	86	.....	.....	.....	26	86	86	86	.....	454	.....
12	0	86	86	.....	.....	.....	27	86	86	86	.....	374	.....
13	81	86	86	.....	.....	.....	28	86	86	86	.....	233	.....
14	81	86	86	.....	0	.....	29	86	86	86	.....	226	.....
15	81	86	86	.....	164	.....	30	86	86	86	.....	522	.....
							31	106	.....	86	.....	382	.....

NOTE.—Discharge determined from a fairly well defined rating curve.

Monthly discharge of Lost River at Wilson Bridge, near Olene, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	152	0	56.8	3,490	B.
November	86	86	86.0	5,120	B.
December	86	86	86.0	5,290	B.
January	86	0	25.0	1,540	B.
February	0	0	0	0	
March	522	0	221	13,600	B.
April	188	0	11.3	672	B.
May	0	0	0	0	
June	0	0	0	0	
July	0	0	0	0	
August	0	0	0	0	
September	0	0	0	0	
The year	522	0	41.0	29,700	

Digitized by Google

Total daily discharge, in second-feet, of Lost River, Lost River diversion canal, and "G" canal, less the discharge of Olene wasteway, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	112	86	86	86	160	246	555	126	144	94	62	100
2	112	86	86	86	160	246	476	126	140	76	98	98
3	112	86	86	86	160	254	387	150	135	70	94	95
4	112	86	86	86	160	365	331	203	159	68	86	91
5	116	86	86	86	160	369	288	147	140	65	72	93
6	121	86	86	86	160	369	288	113	118	74	80	112
7	121	86	86	86	160	369	396	122	90	67	88	120
8	121	86	86	86	166	342	360	120	132	58	75	117
9	122	86	86	115	169	342	360	111	110	44	80	102
10	123	86	86	96	169	304	321	106	107	37	76	92
11	123	86	86	86	169	304	284	100	113	44	57	83
12	123	86	86	90	166	304	261	101	116	56	56	88
13	123	86	86	41	160	304	195	87	104	82	46	88
14	81	86	86	14	166	304	195	88	88	94	60	88
15	81	86	86	89	166	563	186	87	76	103	111	89
16	81	86	86	114	166	672	223	86	61	93	121	90
17	86	86	86	114	166	742	180	107	82	74	121	90
18	86	86	86	114	166	892	180	103	80	59	123	90
19	86	86	86	115	166	900	126	73	81	120	80	89
20	128	86	86	113	160	968	151	77	97	131	66	89
21	96	86	86	107	166	952	168	88	95	131	66	89
22	152	86	86	137	166	952	126	88	96	92	77	89
23	96	86	86	172	169	934	126	84	79	78	77	88
24	86	86	86	142	172	925	168	87	104	76	84	87
25	86	86	86	137	190	934	105	103	100	99	94	84
26	86	86	86	137	199	884	168	112	90	96	97	84
27	86	86	86	137	219	804	168	114	78	91	118	83
28	86	86	86	148	209	584	168	113	94	85	119	83
29	86	86	86	148	.....	595	168	139	96	92	120	83
30	86	86	86	148	.....	967	168	141	95	88	114	83
31	106	.....	86	148	.....	700	.....	143	.....	81	102	.....

Total monthly discharge[a] of Lost River at Wilson Bridge near Olene, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	152	86	104	6,400
November	86	86	86.0	5,120
December	86	86	86.0	5,290
January	172	14	108	6,640
February	219	160	170	9,440
March	967	246	593	36,500
April	555	105	243	14,500
May	203	73	111	6,820
June	159	61	103	6,130
July	131	37	81.2	4,990
August	123	46	87.7	5,390
September	120	83	91.9	5,470
The year	967	14	156	113,000

[a] Includes flow in Lost River diversion canal and "G" canal, less the discharge of Olene wasteway.

LOST RIVER DIVERSION CANAL NEAR OLENE, OREG.

LOCATION.—In the SW. ¼ sec. 29, T. 39 S., R. 10 E., about 4 miles by river below Olene, Klamath County.

RECORDS AVAILABLE.—May 1, 1912, to September 30, 1915.

GAGE.—Vertical staff showing height of water in pond back of head gates and in canal below head gates; read daily or whenever gates are changed.

GATE OPENINGS.—The head works of the canal comprise three hand-operated sliding gates, each 4 feet wide and 6 feet high. The gate openings are recorded each

Digitized by Google

day, and for each period of less than a day when the gates are changed. Water from Klamath River backs up the canal nearly to its head, even if no water is running.

DISCHARGE MEASUREMENTS.—Made from a footbridge a short distance below the head gate.

DISCHARGE COEFFICIENTS.—The discharge coefficients for computing the flow through the gates considered as orifices have been arrived at by plotting the coefficients determined from measurements in three groups—for gate openings, 1.5 to 2.0 feet, 2.5 to 3.5 feet, and 4.0 to 5. 5 feet. The gates are generally opened an even half-foot and seldom less than 1.5 feet. The coefficient has been plotted as coordinate with head-on gates. The coefficients used vary from 0.80 to 0.93 for heads over 1.00 foot, but for low heads exceed 1.00.

EXTREMES OF DISCHARGE.—Maximum discharge during year, 446 second-feet, March 16 to 20, for gate openings on two gates of 4.8 feet and on the third of 5.1 feet, and a head of 0.80 foot. (See footnote to table of daily discharge.) No flow at times.

1912–1915: Maximum discharge, 508 second-feet, February 28, 1914.

ACCURACY.—Results good, except for heads of less than 1.0 foot with low gate openings and for heads of less than 0.5 foot with the higher gate openings. For these conditions the coefficients are not determined closely and the practice of reading the heads only to the nearest half-tenth introduces some uncertainty.

COOPERATION.—Field data furnished by United States Reclamation Service.

This canal diverts water from Lost River into Klamath River to assist in lowering Tule Lake for the purpose of reclaiming the lake bed.

No current-meter measurements were made in 1915.

Daily discharge, in second-feet, of Lost River diversion canal near Olene, Oreg., for the year ending Sept. 30, 1915.

Day.	Oct.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	112	.....	160	246	367	126	43	.....	0	64
2	112	.....	160	246	380	126	41	.....	17	65
3	112	.....	160	254	331	126	37	.....	24	65
4	112	.....	160	365	331	154	64	0	18	65
5	116	.....	160	369	288	87	46	5	8	66
6	121	.....	160	369	288	48	23	5	18	76
7	121	.....	160	369	376	54	29	10	19	75
8	121	0	166	342	360	44	70	11	18	72
9	122	29	169	342	360	29	53	15	18	67
10	123	96	169	304	321	30	42	2	13	57
11	123	86	169	304	284	32	42	3	0	49
12	123	90	166	304	261	35	42	14	0	53
13	42	41	160	304	195	34	28	37	0	53
14	0	14	166	304	195	36	0	40	22	53
15	.....	89	166	399	186	37	.....	41	74	53
16	.....	114	166	446	223	38	.....	22	70	54
17	.....	114	166	446	180	58	.....	2	67	54
18	.....	114	166	446	180	55	.....	0	64	54
19	.....	115	166	446	126	49	.....	23	18	53
20	.....	113	160	446	151	49	.....	34	0	53
21	.....	107	166	430	168	53	.....	35	3	53
22	.....	137	166	430	126	53	.....	10	12	53
23	.....	172	169	430	126	40	.....	0	12	53
24	.....	142	172	430	168	36	.....	.....	32	57
25	.....	137	190	430	105	44	.....	.....	44	58
26	.....	137	199	430	168	46	.....	.....	54	58
27	.....	137	219	430	168	47	.....	.....	65	58
28	.....	148	209	351	168	47	.....	.....	67	58
29	.....	148	.....	369	168	47	.....	.....	65	58
30	.....	148	.....	445	168	47	.....	.....	64	59
31	.....	148	.....	318	.....	47	.....	.....	64	.....

NOTE.—Discharge computed from records of gate opening, head on gates, and coefficients of discharge derived from current-meter measurements.

Digitized by Google

Monthly discharge of Lost River diversion canal near Olene, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.				Accuracy.
	Maximum.	Minimum.	Mean.	Run-off (total in acre-feet).	
October	123	0	47.1	2,900	B.
November	0	0	0	0	
December	0	0	0	0	
January	172	0	83.1	5,110	B.
February	219	160	170	9,440	B.
March	446	246	372	22,900	B.
April	396	105	231	13,700	C.
May	154	29	56.6	3,480	B.
June	70	0	18.7	1,110	B.
July	41	0	10.0	615	B.
August	74	0	30.6	1,880	A.
September	76	49	58.9	3,500	A.
The year	446	0	89.5	64,600	

TULE LAKE NEAR MERRILL, OREG.

LOCATION.—In sec. 8, T. 41 S., R. 11 E., at J. F. Adams's ranch near the mouth of Lost River, 3 miles east of Merrill, Klamath County.

RECORDS AVAILABLE.—May 17, 1904, to September 30, 1915.

GAGE.—Vertical staff fastened to boathouse on shore of lake July 26, 1912, to May 17, 1915, when a new gage was installed about 300 feet farther upstream. Gage heights given below refer to a datum 4,000 feet above sea level; those given in Water-Supply Paper 361, page 450, refer to a datum 4,050 feet above sea level. A vertical staff on a post driven in the lake bed had been used up to July, 1912. The elevation of its zero as determined from the best available information has been as follows:

	Feet.
May 17, 1904	4,047.73
Oct. 21, 1904	4,047.76
May 11, 1907	4,048.56
June 11, 1907	4,048.56
Nov. 27, 1908	[1] 4,048.60

The gage readings made from 1904 to 1912 have been published as reported, and no attempt has been made to reduce them to a uniform datum. A graph of the gage heights has failed to reveal any critical points that would account for a sudden change. It is therefore likely that the gage was raised by the ice a little at a time during the winters of 1905–6 and 1906–7. On account of this error the gage heights prior to May, 1907, should not be used for any refined studies.

EXTREMES OF STAGE.—1904–1915: Maximum stage recorded 11.35 feet April 30 and May 1, 1907, or 4,059.91 feet above sea level. On May 17, 1905, the stage was reported by John H. Lewis to be 10.5 feet, or 4,058.23 feet above sea level. Minimum stage recorded, 4,047.98 feet, September 23, 1915.

DIVERSIONS AND REGULATION.—In June, 1909, the Clear Lake dam was closed, and water has since been released from the reservoir only for short periods. Since May 1, 1912, most of the discharge of Lost River up to about 500 second-feet has been diverted at the Lost River dam into Klamath River. Tule Lake has therefore been falling rapidly since 1909.

COOPERATION.—Since May, 1909, this station has been maintained by the United States Reclamation Service.

[1] Referred to the original bench mark installed in 1904. According to another bench mark it was at elevation 4,048.40.

Digitized by Google

Daily gage height, in feet, of Tule Lake near Merrill, Oreg., for the years ending Sept. 30, 1914 and 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	51.95	.....	51.70	.....	.....	.....	52.20	52.00	.....	51.62	.....	50.60
2	.....	.....	.....	51.80	51.90	51.85	.....	.....	51.52	.....	.....	.....
3	51.80	51.70	51.70	.....	.....	.....	52.10	51.98	.....	51.60	.....	50.58
4	.....	.....	.....	.....	51.90	51.90	.....	.....	51.79	.....	51.08	.....
5	.....	51.70	51.70	51.85	.....	.....	.....	.....	.....	.....	.....	50.55
6	51.90	.....	.....	.....	51.80	51.90	52.10	52.00	51.62	.....	51.07	.....
7	.....	51.70	.....	51.90	.....	.....	.....	.....	.....	51.60	.....	50.45
8	51.85	.....	51.70	.....	.....	.....	52.15	.....	.....	.....	51.02	.....
9	.....	.....	.....	51.95	51.80	52.00	.....	51.95	51.84	51.58	.....	50.33
10	51.90	51.75	51.70	.....	.....	.....	52.10	.....	.....	.....	51.00	.....
11	.....	.....	.....	.....	51.75	52.00	.....	51.90	51.85	51.52	.....	50.22
12	.....	51.70	51.70	52.00	.....	.....	.....	.....	.....	.....	50.95	.....
13	51.80	.....	.....	.....	51.75	52.10	52.10	51.90	51.83	51.49	.....	.....
14	.....	51.70	.....	52.05	.....	.....	.....	.....	.....	.....	50.92	.....
15	51.80	.....	.....	.....	.....	.....	52.10	51.85	51.81	51.48	.....	50.30
16	.....	.....	.....	52.10	51.75	52.10	.....	.....	.....	.....	.....	.....
17	51.75	51.75	.....	.....	.....	.....	.....	.....	51.78	51.42	50.86	50.60
18	.....	.....	.....	.....	51.80	52.05	52.10	51.83	.....	.....	.....	.....
19	.....	51.75	.....	52.50	.....	.....	.....	.....	51.78	.....	50.81	50.31
20	51.80	.....	.....	.....	51.80	52.10	52.12	.....	.....	51.31	.....	.....
21	.....	51.75	.....	52.00	.....	.....	.....	51.85	.....	.....	50.82	50.29
22	51.80	.....	51.70	.....	.....	.....	52.05	.....	.....	51.35	.....	.....
23	.....	.....	.....	52.00	51.80	52.15	.....	51.88	51.73	.....	.....	50.32
24	51.80	51.75	51.70	.....	.....	.....	52.10	.....	.....	.....	50.73	.....
25	.....	.....	.....	.....	51.80	52.10	.....	.....	51.75	51.34	.....	.....
26	.....	51.75	51.70	52.00	.....	.....	52.10	51.68	.....	.....	50.70	50.23
27	51.75	.....	.....	.....	51.80	52.10	.....	.....	51.70	51.33	.....	.....
28	.....	51.70	.....	52.00	.....	.....	.....	51.70	.....	.....	50.65	.....
29	51.75	.....	51.70	.....	.....	.....	52.00	.....	51.68	51.18	.....	50.29
30	.....	.....	.....	52.00	.....	.....	.....	51.70	.....	.....	.....	.....
31	51.70	.....	51.70	.....	.....	.....	.....	.....	.....	51.16	.....	.....
1914–15.												
1	50.28	50.22	50.20	50.15	50.24	50.22	.....	.....	.....	.....	.....	.....
2	.....	.....	.....	.....	.....	.....	.....	50.20	49.96	.....	.....	48.48
3	50.58	.....	50.20	.....	50.24	50.22	.....	.....	.....	.....	.....	.....
4	.....	.....	.....	50.15	.....	.....	.....	.....	50.06	.....	49.06	.....
5	50.55	50.12	50.20	.....	50.23	50.21	50.21	50.20	.....	.....	.....	.....
6	50.45	.....	.....	50.15	.....	.....	.....	.....	.....	49.52	.....	.....
7	.....	50.16	50.20	.....	.....	.....	50.21	50.20	50.06	.....	.....	.....
8	50.33	.....	.....	50.15	50.23	50.22	.....	.....	49.96	.....	.....	.....
9	.....	.....	50.30	.....	.....	.....	50.21	.....	.....	.....	48.94	.....
10	50.21	.....	.....	.....	50.23	.....	.....	50.20	.....	.....	.....	48.26
11	.....	.....	50.30	.....	.....	.....	.....	.....	49.96	.....	.....	.....
12	50.20	.....	.....	50.15	50.23	50.22	50.21	.....	.....	.....	.....	.....
13	.....	.....	.....	.....	.....	.....	.....	50.20	.....	.....	48.86	.....
14	50.19	.....	50.30	.....	.....	.....	50.23	50.20	49.96	49.40	.....	.....
15	.....	.....	50.30	.....	50.23	50.22	.....	.....	.....	.....	.....	.....
16	50.22	50.20	.....	50.15	.....	.....	50.23	.....	49.86	.....	.....	.....
17	.....	.....	50.25	.....	50.23	50.22	50.23	50.17	.....	.....	.....	48.23
18	.....	50.22	50.25	50.15	.....	.....	.....	.....	49.86	.....	.....	.....
19	50.30	.....	.....	.....	.....	.....	50.21	.....	.....	.....	.....	.....
20	.....	50.28	.....	50.15	50.22	50.22	.....	.....	.....	.....	48.78	.....
21	.....	.....	50.25	.....	.....	.....	50.20	.....	49.86	49.26	.....	.....
22	.....	.....	.....	50.15	50.22	50.22	.....	.....	.....	.....	.....	.....
23	.....	50.20	50.15	.....	.....	.....	50.20	.....	.....	.....	.....	47.98
24	.....	50.20	.....	.....	.....	50.22	.....	50.06	.....	.....	.....	.....
25	.....	.....	50.15	50.15	50.23	.....	.....	.....	49.86	.....	.....	.....
26	.....	50.20	.....	.....	.....	50.21	50.19	49.96	.....	.....	.....	.....
27	.....	.....	.....	50.15	50.22	.....	.....	.....	.....	49.02	.....	48.08
28	.....	50.20	50.15	.....	.....	.....	50.19	50.06	49.66	.....	.....	.....
29	.....	.....	.....	50.15	.....	50.21	.....	.....	.....	.....	.....	.....
30	.....	.....	50.15	.....	.....	.....	50.19	.....	49.66	.....	48.59	.....
31	.....	.....	.....	.....	.....	50.21	.....	50.06	.....	.....	.....	.....

Digitized by Google

MILLER CREEK NEAR LORELLA, OREG.

LOCATION.—In sec. 7, T. 40 S., R. 14 E., at the site of an old wagon bridge, about three-fourths mile above the highway bridge, 1 mile east of the Swingle ranch in Langell Valley, and 3 miles south of Lorella, Klamath County.

DRAINAGE AREA.—270 square miles.

RECORDS AVAILABLE.—April 1, 1909, to September 30, 1915; August 10, 1904, to December, 1908, for a station in sec. 12, T. 39 S., R. 13 E., at the lower end of Horsefly Valley and 10 miles or more by creek above the present station; only a small amount of inflow between the two points.

GAGE.—Friez water-stage recorder on left bank attached to old bridge abutment.

DISCHARGE MEASUREMENTS.—Made from highway bridge, or by wading at low water; current is sluggish at the bridge, as the gradient of the stream is flat.

CHANNEL AND CONTROL.—Stream bed, rocks and gravel, overlain with some silt; control fairly permanent; left bank overflows in floods.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 6.88 feet at 3 a. m. March 24 (discharge, 1,250 second-feet); minimum stage from water-stage recorder, 2.20 feet August 2 to September 7 (creek probably dry or nearly so).

1904–1915: Maximum stage recorded, 14.0 feet, February 5, 1907 (discharge 6,730 second-feet).

WINTER FLOW.—Stage-discharge relation apparently not materially affected by ice, as control remains open. Open-channel rating curve was formerly applied throughout the winter, but no discharge records have been computed for low-water stages in 1915.

DIVERSIONS.—A small irrigating flume, carrying about 1 second-foot, diverts just above the present station, and probably a considerable area is irrigated above the station.

REGULATION.—Flow may be occasionally affected by a rock and brush diversion dam just above gage.

ACCURACY.—Results good for higher stages as the curve defined by measurements of 1910–11 has been confirmed by measurements in 1915–16; for low and medium stages the rating curve is very uncertain and no estimates have been attempted except for months of considerable run-off.

COOPERATION.—Field data furnished by United States Reclamation Service, Klamath project.

Discharge measurements of Miller Creek near Lorella, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Nov. 6	Henshaw and Mosier	2.83	0.9
May 19	C. P. Hughes	3.59	27.8

Digitized by Google

Daily discharge, in second-feet, of Miller Creek near Lorella, Oreg., for the year ending Sept. 30, 1915.

Day.	Feb.	Mar.	Apr.	May.	June.	Day.	Feb.	Mar.	Apr.	May.	June.
1	1.5	37	241	2.8	3.2	16	6	578	9	12	.4
2	2.0	33	210	.8	2.4	17	7	591	6	9	.3
3	2.3	38	228	.8	1.8	18	53	682	3.4	10	.5
4	2.0	74	228	1.0	1.4	19	94	710	2.3	16	.8
5	2.0	44	144	1.0	1.0	20	81	710	1.7	21	.5
6	2.5	31	67	2.5	.8	21	36	720	1.4	15	.5
7	3.0	18	39	2.5	.4	22	33	710	.7	13	.5
8	3.5	20	38	2.5	.3	23	15	720	.6	14	.5
9	4.0	15	36	2.5	.5	24	15	770	.5	14	.5
10	4.5	48	23	2.8	.6	25	147	540	.6	16	.5
11	5.0	81	16	4	.6	26	78	362	.6	21	.5
12	5.5	114	13	8	.8	27	57	301	1.1	15	.4
13	6	202	11	8	1.0	28	46	663	3.7	11	.4
14	6	504	13	9	1.0	29	.....	574	3.2	9	.4
15	6	561	13	9	.7	30	.....	311	2.8	7	.3
						31	.....	285	.....	5	.....

NOTE.—Discharge determined from a well-defined rating curve; Feb. 6–12, Mar. 10 and 11 interpolated.

Monthly discharge of Miller Creek near Lorella, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
February	147	1.5	25.8	1,430	B.
March	770	15	356	21,900	B.
April	241	.5	45.3	2,700	B.
May	21	.8	8.55	526	B.
The period				26,600	

NOTE.—Discharge October to January and June to September probably ranged from zero to about 3 second-feet on June 1, and the total run-off for these months is believed to have been 400 to 500 acre-feet.

OLENE WASTEWAY AT OLENE, OREG.

LOCATION.—In the SW. ¼ sec. 14, T. 39 S., R. 10 E., at the flume on the F canal of the Klamath project that crosses Lost River at Olene, Klamath County, about 4 miles upstream from Lost River dam.

RECORDS AVAILABLE.—June 5 to September 8,1915.

GAGE.—Records are kept of width of gate opening and of head of water on the orifice.

DISCHARGE MEASUREMENTS.—Made in flume above and below wasteway, and difference between the two measurements taken as outflow from wasteway.

ACCURACY.—The coefficient of discharge is somwhat uncertain for discharge that varies much from those shown in table of discharge measurements, but the total for the year is probably not materially in error.

COOPERATION.—Results furnished by United States Reclamation Service.

The Olene wasteway is used to supply water from Link River to supplement the flow of Lost River when the latter is insufficient to supply the G canal. The records are used in obtaining the total natural flow of Lost River.

Digitized by Google

Discharge measurements of Olene wasteway at Olene, Oreg., during the year ending Sept. 30, 1915.

Head.[a]	Height of gate.	Width of gate.	Area of opening.	Discharge.	Coefficient of discharge.
Feet.	*Feet.*	*Feet.*	*Sq. ft.*	*Sec.-ft.*	
3.94	0.75	2.10	1.58	17.2	0.65
3.90	.70	2.10	1.47	14.0	.60

[a] On center of gate opening.

Daily discharge, in second-feet, of Olene wasteway at Olene, Oreg., for the year ending Sept. 30, 1915.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1	.....	0	23.3	0	16	19.6	0	0	.....
2	.....	9.8	4.5	0	17	4.5	0	1.2	.....
3	.....	13.7	13.8	0	18	11.6	0	0	.....
4	0	13.8	13.8	0	19	13.2	0	0	.....
5	4.5	11.8	13.8	1.2	20	0	0	0	.....
6	4.5	5.3	11.8	1.2	21	3.6	0	3.1	.....
7	37.2	4.8	6.5	1.2	22	0	0	3.1	.....
8	35.0	9.8	11.4	1.2	23	7.7	0	1.2	.....
9	37.2	17.6	4.3	0	24	0	0	1.2	.....
10	25.0	9.8	3.3	.....	25	0	7.7	3.2	.....
11	14.9	4.5	7.0	.....	26	7.6	7.5	3.2	.....
12	9.6	4.5	4.0	.....	27	12.4	0	3.2	.....
13	9.6	4.4	3.1	.....	28	0	3.4	3.1	.....
14	0	0	3.1	.....	29	0	3.4	1.2	.....
15	0	0	1.2	.....	30	0	7.6	1.2	.....
					31	.....	16.0	1.2	.....

NOTE.—Discharge computed from records of gate opening; head on gate and coefficient of discharge derived from current-meter measurements.

Monthly discharge of Olene wasteway at Olene, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
June	37.2	0	8.59	511
July	17.6	0	5.01	308
August	23.3	0	4.87	299
September	1.2	0	.16	10
The period	.....	.....	.....	1,130

"G" CANAL[1] NEAR OLENE, OREG.

LOCATION.—In the SW. ¼ sec. 29, T. 39 S., R. 10 E., about 200 feet below head gates and 4 miles below Olene, Klamath County.

RECORDS AVAILABLE.—July 1, 1912, to September 30, 1915.

GAGE.—Gurley graph water-stage recorder.

DISCHARGE MEASUREMENTS.—Made from a wagon bridge about 1,500 feet below intake.

CHANNEL AND CONTROL.—Control is a timber check about one-half mile below gage; checks the water back to the intake.

EXTREMES OF DISCHARGE.—Maximum discharge, 107 second-feet for a stage of 3.39 feet July 25. No flow at times.

[1] Formerly called Griffith lateral.

Digitized by Google

ACCURACY.—Results good. The results of changes in the check, as shown by the graph of the gage height, have been used in determining corrections to gage readings. Varying heads on the intake structure also had considerable effect on the stage-discharge relation.

COOPERATION.—Records furnished by United States Reclamation Service.

Discharge measurements of "G" canal near Olene, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 5	H. W. Humphrey	2.14	60.4	July 19	C. P. Hughes	2.70	58.6
10	C. P. Hughes	2.26	70.0	26	do	3.37	106
14	H. W. Humphrey	2.04	53.8	Aug. 3	Humphrey & Leavitt	2.96	84.2
26	C. P. Hughes	3.10	66.1	8	A. L. Leavitt	2.52	67.4
June 2	do	3.22	94.0	16	do	2.27	50.2
4	do	3.06	96.4	23	do	2.62	66.9
10	do	3.16	86.1	30	do	1.90	48.1
22	do	3.70	96.1	Sept. 6	do	1.54	26.0
29	do	3.50	93.5	13	do	1.74	34.6
July 7	Humphrey and Hughes	3.10	60.8	20	do	1.75	36.4
11	C. P. Hughes	2.80	46.6	30	H. W. Humphrey	1.49	24.9

Daily discharge, in second-feet, of "G" canal near Olene, Oreg., for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	0	101	94	85	36	16	48	81	71	51	36
2	0	99	86	85	33	17	49	87	72	55	36
3	24	98	84	84	30	18	48	92	59	59	36
4	49	95	78	82	26	19	24	94	97	62	36
5	60	98	72	78	28	20	28	97	98	66	36
6	65	99	74	74	37	21	35	99	96	66	36
7	68	98	62	76	46	22	35	96	82	68	36
8	76	97	57	68	46	23	44	87	78	66	35
9	82	94	47	66	35	24	51	104	76	53	30
10	76	90	45	66	35	25	59	100	107	53	26
11	68	86	45	64	34	26	66	98	104	46	26
12	66	84	47	60	35	27	67	90	91	56	25
13	53	84	49	49	35	28	66	94	88	55	25
14	52	88	54	41	35	29	92	96	96	56	25
15	50	76	62	38	36	30	94	95	96	51	24
						31	96	.....	97	39	.....

NOTE.—Discharge determined by indirect method for shifting control. The correction curve is fairly well defined.

Monthly discharge of "G" canal near Olene, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	96	0	54.5	3,350	B.
June	104	76	93.2	5,550	B.
July	107	45	76.3	4,690	B.
August	85	38	61.9	3,810	B.
September	46	24	33.2	1,980	B.
The period	.....	.....	.....	19,300	

Digitized by Google

LOWER KLAMATH LAKE NEAR BROWNELL, CAL.

LOCATION.—In sec. 35, T. 47 N., R. 2 E., at Laird's landing at the extreme south end of Lower Klamath Lake, about 6 miles southeast of Brownell, Siskiyou County.

RECORDS AVAILABLE.—January 23, 1907, to July 15, 1909; August 1, 1912, to September 30, 1915.

GAGE.—Vertical staff on northeast bent of wharf; datum, 4.085.00 [1] feet above sea level; up to August 12, 1915, and 4,083.18 feet after that date; readings for 1915 reduced to a datum 4,080 feet above sea level. Vertical staff, 1907 to 1909; datum, 4,082.5 feet above sea level.

EXTREMES OF STAGE.—Maximum stage recorded during year, 4,086.6 feet April 30; minimum stage recorded, 4,084.78 feet August 28, 30, and September 11, 19.

1907–1909 and 1912–1915: Maximum stage recorded, 4,087.4 feet April 28 and 29, 1914; minimum stage recorded, 4,084.10 feet September 10 to 22, 1908.

COOPERATION.—Records furnished by U. S. Reclamation Service.

Daily gage height, in feet, of Lower Klamath Lake near Brownell, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5.20	5.30	5.40	.....	5.40	6.00	6.00	6.50	6.40	5.70	5.10	4.98
2	5.10	5.30	5.30	5.40	5.40	6.00	.....	6.40	.....	5.80	5.10	4.88
3	5.30	5.30	5.30	5.30	.....	6.00	.....	6.40	.....	5.80	5.20	4.98
4	5.30	5.30	5.20	5.40	.....	5.90	.....	6.50	6.30	5.70	5.10	4.88
5	5.40	5.30	5.30	5.30	.....	6.00	.....	6.40	6.30	5.80	5.10	4.88
6	5.30	5.30	5.40	5.40	.....	6.00	.....	6.50	6.20	.....	5.10	4.98
7	5.30	5.30	5.30	5.40	5.40	6.10	.....	6.40	6.20	5.70	5.00	4.88
8	5.10	5.30	5.30	5.30	.....	6.10	.....	6.50	6.30	5.60	.....	4.88
9	5.20	5.40	5.40	5.30	.....	6.10	.....	6.30	6.20	5.60	.....	4.98
10	5.30	5.30	5.30	.....	.....	6.10	.....	6.30	6.20	5.70	.....	4.88
11	5.30	5.30	5.30	.....	.....	6.00	6.10	6.30	6.20	5.60	.....	4.78
12	5.30	5.30	5.40	5.20	5.40	5.90	6.10	6.40	6.10	5.70	.....	4.88
13	5.30	5.30	5.40	5.30	5.50	5.90	6.20	6.40	6.20	5.60	.....	4.88
14	5.30	5.40	5.40	5.30	5.50	6.00	6.40	6.40	6.10	5.70	.....	4.98
15	5.30	5.40	5.30	5.20	5.60	6.10	6.20	6.50	6.00	.....	.....	4.88
16	5.30	5.40	5.40	5.30	5.70	6.10	6.30	6.40	6.10	5.60	4.98	4.98
17	5.30	5.40	5.30	5.30	5.70	.....	6.30	6.30	6.00	5.50	4.88	4.88
18	5.30	5.40	5.40	5.30	5.70	5.90	6.30	6.40	5.90	5.60	4.98	4.88
19	5.40	5.40	5.40	5.30	5.70	6.00	6.20	6.50	6.00	5.50	4.88	4.78
20	5.30	5.40	5.40	.....	5.70	6.30	6.30	6.40	6.00	5.40	4.88	4.88
21	5.40	5.40	5.30	.....	5.70	.....	.....	6.30	5.90	5.40	4.88	4.98
22	5.30	5.30	5.40	.....	5.70	.....	.....	6.40	6.00	5.30	4.98	4.88
23	5.30	5.30	5.40	.....	5.80	6.30	6.30	.....	5.90	5.40	4.88	4.98
24	5.30	5.40	5.40	.....	5.80	6.30	6.30	6.30	6.00	5.30	4.88	5.08
25	5.40	5.30	5.40	5.30	5.80	6.20	6.20	6.30	6.10	5.30	4.98	4.98
26	5.30	5.30	5.30	5.30	5.90	6.30	6.30	6.40	5.90	5.30	4.98	4.98
27	5.30	5.30	5.40	5.40	5.90	6.40	6.40	6.30	5.90	5.20	4.88	5.08
28	5.30	5.30	5.40	5.30	5.90	6.30	6.30	6.40	5.80	5.10	4.78	4.98
29	5.30	5.30	5.40	5.30	.....	6.50	6.50	6.30	5.80	5.20	4.88	4.88
30	5.40	5.30	5.40	5.30	.....	6.60	6.60	6.40	5.90	5.20	4.78	4.98
31	5.40	.....	5.40	5.40	.....	.....	.....	6.30	.....	5.30	4.88	.....

NOTE.—Gage heights in the above table refer to a datum 4,080 feet above sea level.

EAST FORK OF SCOTT RIVER AT CALLAHAN, CAL.

LOCATION.—In the SW. ¼ SW. ¼ sec. 16, T. 40 N., R. 8 W., in Shasta National Forest, at highway bridge at Callahan, Siskiyou County, about 800 feet above junction with South Fork.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 6, 1913, to September 30, 1915 (fragmentary).

[1] Reported erroneously as 4,084 feet in Water-Supply Paper 391.

Digitized by Google

GAGE.—Staff in two sections on left bank; read once a day by F. H. Williams. Lower section is inclined and is fastened to cottonwood tree 10 feet upstream from bridge; upper section is vertical and is fastened to left abutment of bridge.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Boulders and small gravel; fairly permanent. One channel at all stages.

EXTREMES OF STAGE.—Maximum stage recorded during year, 7.4 feet at 7 p. m., June 8; minimum stage recorded, 5.15 feet, September 12, 19, and 24.

1913–1915: Maximum stage recorded, 7.45 feet at 4 p. m., April 11, 1914; minimum stage recorded, 5.13 feet from 10.30 to 11 a. m. (discharge measurement), September 9, 1913 (discharge, 8.2 second-feet).

DIVERSIONS.—No information.

REGULATION.—No information.

COOPERATION.—Gage-height record furnished by United States Forest Service. Data inadequate for determination of discharge.

The following discharge measurement was made by H. J. Tompkins:
September 14, 1915: Gage height, 5.18 feet; discharge, 9.5 second-feet.

Daily gage height, in feet, of East Fork of Scott River at Callahan, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1					6.75	7.15			
2									
3	5.26		5.35		6.55	6.95	6.4	5.6	
4	5.25				6.5				
5			5.32				6.3		
6		5.37				7.15			
7	5.25				6.4				5.20
8	5.26	5.37				7.4			
9		5.37				7.15			
10				6.5					
11	5.27								
12						6.55	6.1		5.15
13	5.30		5.30			6.55		5.4	
14									
15		5.36			6.8				
16				6.85		6.7			
17	5.70	5.37			6.9	6.7			5.17
18	5.85					6.8			
19						6.7			5.15
20		5.36		7.25	6.7			5.1	
21						6.5			
22	5.50				7.0	6.5			
23	5.45					6.5			
24		5.38		6.8	7.05				5.15
25						6.4			
26							5.7		
27	5.40	5.37		6.8	7.0				
28					7.1				
29		5.38			7.2	6.4	5.6		
30	5.37			6.75					
31									

SCOTT RIVER AT CALLAHAN, CAL.

LOCATION.—In the NE. ¼ sec. 17, T. 40 N., R. 8 W., in Shasta National Forest, at highway bridge three-fourths mile below junction of East and South forks, 1 mile northwest of Callahan, Siskiyou County. Wildcat Creek enters 500 feet above and Sugar Creek 1½ miles below the station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 12, 1911, to September 30, 1915 (fragmentary).

Digitized by Google

GAGE.—Vertical staff in two sections on right bank; read once a day by F. H. Williams. Original gage was just above power house, about 2,000 feet above present location. November 14, 1912, gage was installed at present location, independent datum, and June 26, 1914, its datum was raised 0.91 foot.

DISCHARGE MEASUREMENTS.—Made from highway bridge at gage or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; fairly permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.4 feet at 11.30 a. m., June 6 (discharge, 885 second-feet); minimum stage recorded, 0.95 foot, September 13 and 24 (discharge, 18 second-feet).

1911–1915: Maximum stage recorded, 3.4 feet at 11.30 a. m., June 6, 1915 (discharge, 885 second-feet); minimum stage recorded, 2.0 feet (old datum), September 25 and 28, 1913 (discharge, 11 second-feet).

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Results good for days on which gage was read.

COOPERATION.—Gage-height record furnished by United States Forest Service.

The following discharge measurement was mase by H. J. Tompkins:

September 14, 1915: Gage height, 1.00 foot; discharge, 21 second-feet.

Daily discharge, in second-feet, of Scott River at Callahan, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1					545	820			
2									
3	33		55		520		445	92	
4					422				
5			54				400		
6		55				885			21
7	33				400				
8		55							
9		55							
10				470					
11	33							58	
12						622	335		
13	37		50			595		58	18
14									21
15		52							
16				545		595			
17									21
18	148	54							
19				732			185		21
20							185	31	
21						545			
22							185		
23	74	55			650				
24				622					18
25						445	160		
26									
27	58			595					
28					790				
29		58			820	445			
30				570					
31									

NOTE.—Discharge determined from a fairly well defined rating curve.

INDIAN CREEK NEAR HAPPY CAMP, CAL.

LOCATION.—In the NW. ¼ sec. 22, T. 17 N., R. 7 E., in Klamath National Forest, at highway bridge at Roberts ranch, about 4¾ miles north of Happy Camp, Siskiyou County, and junction with Klamath River.

DRAINAGE AREA.—Not measured.

Digitized by Google

RECORDS AVAILABLE.—September 8, 1911, to September 30, 1915 (fragmentary).

GAGE.—Staff in three sections; read once a day by M. M. Morgan. Section No. 1 is vertical and fastened to stump on right bank 2 feet above bridge; No. 2 is vertical and fastened to right abutment of bridge near downstream end; No. 3 is inclined and fastened to alder tree on left bank 12 feet below bridge. Original gage was vertical staff fastened to alder tree on left bank about 700 feet above bridge. November 20, 1912, present gage was installed at an independent datum.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Small boulders and gravel; permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.2 feet at 10 a. m. February 1 (discharge, 5,180 second-feet, determined from extension of rating curve and may be subject to error); minimum stage recorded, 2.75 feet September 8, 12, 25, and 29 (discharge, 34 second-feet).

1911–1915: Maximum stage recorded, 10.6 feet February 17, 1912 (discharge, 8,430 second-feet, determined from extension of rating curve and may be subject to error); minimum stage recorded, 2.5 feet August 19 to September 6, 1914 (discharge, 20 second-feet).

DIVERSIONS.—The Reeve Davis Consolidated Mining Co.'s ditch diverts water above and returns it to the stream below the station; other small ditches use water for mining purposes.

REGULATION.—None.

ACCURACY.—Results good for days when gage was read.

COOPERATION.—Gage-height record furnished by United States Forest Service.

The following discharge measurement was made by H. J. Tompkins:
September 8, 1915: Gage height, 2.76 feet; discharge, 42 second-feet.

Daily discharge, in second-feet, of Indian Creek near Happy Camp, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Sept.	Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Sept.
1	.....	.....	110	.....	5,180	.....	16	.....	.....	.....	.....	.....	.....
2	.....	205	130	.....	.....	.....	17	.....	.....	.....	295	.....	.....
3	.....	155	.....	.....	.....	.....	18	430	.....	130	235	.....	.....
4	.....	.....	155	.....	.....	.....	19	1,770	.....	.....	.....	.....	.....
5	.....	.....	155	.....	.....	.....	20	.....	.....	.....	.....	.....	.....
6	.....	.....	.....	.....	.....	.....	21	.....	47	.....	.....	.....	.....
7	.....	.....	.....	.....	.....	.....	22	220	.....	75	.....	.....	.....
8	.....	.....	.....	.....	.....	34	23	.....	42	.....	.....	.....	.....
9	.....	.....	.....	.....	.....	.....	24	.....	37	.....	.....	.....	.....
10	130	.....	.....	.....	.....	.....	25	.....	.....	.....	.....	.....	34
11	.....	.....	.....	.....	.....	.....	26	.....	.....	.....	.....	.....	.....
12	.....	.....	.....	.....	.....	34	27	.....	90	.....	.....	.....	.....
13	.....	.....	130	.....	.....	.....	28	155	168	.....	235	.....	.....
14	.....	.....	.....	.....	.....	.....	29	.....	.....	.....	.....	.....	34
15	.....	.....	.....	.....	.....	.....	30	.....	.....	.....	.....	.....	.....
							31	90	.....	110	675	.....	.....

NOTE.—Discharge determined from a rating curve well defined except for extremely high and low water.

SALMON RIVER AT SOMESBAR, CAL.

LOCATION.—In the SE. ¼ sec. 2, T. 13 N., R. 6 E., below suspension footbridge about 600 feet northeast of Somesbar post office, Siskiyou County, and about 1¾ miles above junction with Klamath River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 17, 1911, to September 8, 1915, when the station was discontinued.

GAGE.—Vertical staff in two sections on right bank about 900 feet below bridge; lower section is fastened to an alder tree; upper section is also fastened to an alder tree 15 feet upstream. Gage is read once a day by W. H. Hotelling.

Digitized by Google

DISCHARGE MEASUREMENTS.—Made from bridge above gage or by wading.

CHANNEL AND CONTROL.—Boulders and gravel; fairly permanent. Both banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.8 feet at 4 p. m. February 1 (discharge, 23,600 second-feet, determined from extension of rating curve and may be subject to error); minimum stage recorded, 3.50 feet at 6 a. m. September 7 and 8 (discharge, 225 second-feet).

1911–1915: Maximum stage recorded, 14.1 feet at 3.30 p. m. February 17, 1912 (discharge, 33,000 second-feet, determined from extension of rating curve and may be subject to error); minimum stage recorded, 3.5 feet September 20 to 25, October 6 to 8, and November 3 to 7, 1911 (discharge, 180 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—For days when gage was read results excellent except for extremely high water.

COOPERATION.—Gage-height record furnished by W. H. Hotelling.

Discharge measurements of Salmon River at Somesbar, Cal., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 2	Charles Leidl	4.33	677	Aug. 8	Carl Langford	3.9	380
2	do	4.30	654				

Daily discharge, in second-feet, of Salmon River at Somesbar, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	269	850		545	15,900	2,460	5,830	5,830	4,710	2,460	445	252
2			905	580	16,600		6,430			2,100		246
3				580	9,990	2,650	6,740	3,490	4,710		445	243
4					5,830		6,130					243
5						2,650		3,270	4,980	1,770	385	240
6			1,620	1,200			5,830			1,770	385	
7		960		1,330	3,270	2,850		3,270	5,260	1,620		225
8				4,450			5,260	3,270	5,260		409	225
9	272			2,280		2,960		5,540		1,470		
10						3,060	4,980	6,130		1,470	385	
11				1,200			4,980	4,710	5,260	1,540		
12					3,490		4,710		5,260	1,400	385	
13		1,020		1,260						1,330		
14				3,720			4,200	4,450	3,720	1,200	385	
15			1,620	3,960		3,060	3,960			1,020		
16					1,930			5,260		850	355	
17						3,270		5,260			345	
18							4,200		2,850	850	330	
19		1,080				4,200	4,710	4,450		850	312	
20	5,830			1,400			5,260	3,960				
21			850		3,490	4,450	5,830	3,720	2,460			
22							5,830	3,270		850	312	
23				1,330		4,710		3,270	2,460			
24								3,720		660	312	
25			620			4,710	5,260			660		
26								3,960	2,100	620		
27						4,980	5,260	4,710		580	290	
28					2,100				1,930	545	286	
29						5,260		4,710	1,770	510	283	
30		510	445	1,470		5,540	5,830		2,280		280	
31	445		445	4,450		5,830		5,260			276	

NOTE.—Discharge determined from a rating curve well defined below 8,000 second-feet.

Digitized by Google

TRINITY RIVER AT LEWISTON, CAL.

LOCATION.—In the NE. ¼ sec. 19, T. 33 N., R. 8 W., at highway bridge at Lewiston, Trinity County, and about 9 miles below Stewarts Fork. Indian Creek enters 6 miles below the station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 28, 1911, to September 30, 1915.

GAGE.—Vertical staff in two sections on left bank at bridge; read twice a day by W. W. Phillips. Lower section fastened to pile 10 feet upstream from bridge; upper section fastened to downstream end of bridge abutment.

DISCHARGE MEASUREMENTS.—Made from bridge, at gage, or by wading.

CHANNEL AND CONTROL.—Small boulders and gravel; appears permanent. Both banks are subject to overflow at extremely high water.

EXTREMES OF DISCHARGE.—Maximum stage during year, 15.2 feet at 10 a. m., crest of flood of February 2 (discharge, 23,000 second-feet, determined from extension of rating curve and may be subject to error); minimum stage recorded, 2.4 feet October 1 and September 26 to 30 (discharge, 175 second-feet).

1911–1915: Maximum stage recorded, 16.7 feet at 12.30 p. m. January 2, 1914 (discharge, 26,900 second-feet, determined from extension of rating curve and may be subject to error); minimum stage recorded, 2.28 feet, September 1, 1911 (discharge, 145 second-feet).

DIVERSIONS.—Water is diverted above the station for irrigation, placer mining, and power development.

REGULATION.—None.

ACCURACY.—Results excellent.

The following discharge measurement was made by H. J. Tompkins:

September 16, 1915: Gage height, 2.60 feet; discharge, 230 second-feet.

Daily discharge, in second-feet, of Trinity River at Lewiston, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	175	545	360	360	9,520	3,520	7,060	5,980	9,960	3,800	765	258
2	190	545	360	360	18,200	3,250	7,450	5,480	9,300	3,940	765	240
3	205	435	410	385	8,050	2,990	7,850	4,390	9,300	3,940	765	338
4	205	410	460	460	4,690	2,730	7,060	3,940	9,090	3,800	700	258
5	205	360	515	460	3,800	2,860	5,980	3,800	9,520	3,660	668	240
6	205	360	460	635	2,990	2,730	5,640	3,940	9,960	3,120	635	222
7	205	315	460	765	2,600	2,730	5,980	5,160	9,520	2,730	575	240
8	205	315	460	942	7,060	2,470	6,680	5,810	9,520	2,730	515	222
9	410	315	515	870	6,680	2,470	6,150	7,850	9,960	2,470	515	205
10	700	315	488	732	4,840	2,600	5,640	11,100	8,460	2,470	515	205
11	385	315	460	635	3,800	2,730	5,980	9,090	7,450	2,230	488	205
12	338	275	460	635	2,860	3,800	6,680	8,670	5,810	2,470	488	205
13	315	275	460	700	2,470	3,940	6,680	7,250	5,640	2,230	460	205
14	295	315	435	635	2,110	4,240	5,640	6,320	5,810	1,890	435	205
15	275	295	410	635	2,000	4,390	5,320	5,980	5,640	1,780	410	205
16	275	275	410	605	4,240	4,690	6,320	5,980	5,640	1,580	410	205
17	1,480	275	385	575	6,320	5,160	6,680	10,400	5,000	1,580	410	205
18	980	275	360	545	6,320	5,320	7,060	7,850	4,690	1,440	410	205
19	2,230	275	360	515	5,160	5,640	8,460	6,680	4,540	1,440	410	205
20	1,220	275	360	515	4,540	5,480	8,880	5,980	4,540	1,340	385	205
21	800	275	360	515	3,940	6,320	8,670	5,810	4,390	1,340	338	205
22	668	258	338	488	3,520	7,060	7,060	5,810	4,690	1,340	338	205
23	545	240	360	460	3,660	7,060	6,680	6,150	4,690	1,440	315	205
24	488	240	360	410	4,690	7,450	5,980	7,850	4,490	1,580	315	190
25	410	275	360	460	4,690	7,060	5,980	7,450	3,800	1,300	315	190
26	410	275	360	515	4,090	7,060	5,320	8,050	3,520	1,180	315	175
27	360	258	360	732	3,940	7,650	6,320	8,250	3,250	1,060	315	175
28	360	315	360	2,230	3,800	18,500	11,100	9,740	3,660	980	275	175
29	360	360	360	4,540	.....	13,200	10,600	9,090	4,090	905	275	175
30	360	360	360	5,810	.....	10,600	8,670	9,090	3,800	800	275	175
31	360	.....	360	4,690	.....	8,880	.....	8,670	.....	870	275	.....

NOTE.—Discharge determined from a rating curve well defined below 10,000 second-feet.

Digitized by Google

Monthly discharge of Trinity River at Lewiston, Cal., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	2,230	175	504	31,000	A.
November	545	240	321	19,100	A.
December	515	338	404	24,800	A.
January	5,810	360	1,060	65,200	A.
February	18,200	2,000	5,020	279,000	A.
March	18,500	2,470	5,630	346,000	B.
April	11,100	5,320	6,990	416,000	A.
May	11,100	3,800	7,020	432,000	A.
June	9,960	3,250	6,310	375,000	A.
July	3,940	800	2,050	126,000	A.
August	765	275	454	27,900	A.
September	338	175	212	12,600	A.
The year	18,500	175	2,980	2,150,000	

TRINITY RIVER AT HOOPA, CAL.

LOCATION.—In the NW. ¼ sec. 25, T. 8 N., R. 4 E., at Hoopa Indian Agency, Humboldt County, about 1 mile above Hoopa Ferry, and about 11 miles above junction with Klamath River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 3, 1911, to December 7, 1914 (broken).

GAGE.—Staff in four sections on left bank 800 feet above mouth of Supply Creek; read twice a day by Berryman Lack, jr.

DISCHARGE MEASUREMENTS.—Made from standard gaging car on ferry cable 1 mile below gage. As Supply Creek enters between gage and ferry, it is necessary to deduct discharge of this stream from measurements made at ferry to obtain flow at gage.

CHANNEL AND CONTROL.—Sand and gravel; fairly permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—1911–1914: Maximum stage recorded, 28.1 feet at 5 p. m. December 31, 1913 (discharge, 89,000 second-feet, determined from extension of rating curve and may be subject to error); minimum stage recorded, 4.4 feet September 3, 1911 (discharge, 375 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Results good for days when gage was read.

COOPERATION.—Gage-height record furnished by United States Indian Service.

Discharge measurements of Trinity River at Hoopa, Cal., during the year ending Sept. 30, 1915.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 31	5.56	938
31	5.56	933

Digitized by Google

Daily discharge, in second-feet, of Trinity River at Hoopa, Cal., for the period Nov. 1 to Dec. 7, 1914.

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1	1,190	1,540	11	845	.....	21	770	.....
2	1,190	1,440	12	845	.....	22	770	.....
3	1,340	1,760	13	805	.....	23	735	.....
4	1,060	2,240	14	805	.....	24	735	
5	1,060	2,120	15	805	.....	25	735	.....
6	970	2,120	16	805	.....	26	735	.....
7	970	2,240	17	770	.....	27	805	.....
8	970	.....	18	805	.....	28	1,060	.....
9	885	.....	19	805	.....	29	.....	.....
10	845	.....	20	805	.....	30	.....	.....
						31	.....	.....

NOTE.—Discharge determined from a rating curve well defined below and fairly well defined above 1,300 second-feet.

COFFEE CREEK AT COFFEE, CAL.

LOCATION.—In the NW. ¼ sec. 4, T. 37 N., R. 8 W., in Shasta National Forest, at private highway bridge at Coffee, Trinity County, and 5 miles above junction with Trinity River. Boulder Creek enters 400 feet above and Little Boulder Creek 1½ miles below the station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 16, 1910, to October 21, 1914, when station was discontinued; record fragmentary.

GAGE.—Vertical staff fastened to upstream end of bridge pier near right bank; read once a day by Edward Abernathy.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge at gage or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; fairly permanent.

EXTREMES OF DISCHARGE.—1911–1914: Maximum stage recorded, 7.0 feet May 27 and June 3 to 5, 1912 (discharge, 2,630 second-feet); minimum stage recorded, 3.45 feet September 28 to October 7, 1914 (discharge, 34 second-feet).

DIVERSIONS.—None.

REGULATION.—From April to July, inclusive, and occasionally throughout the remainder of the year, two dams with automatic or "self-shooting" gates are operated about 10 miles above the station. The Nash mine operates a dam having a working capacity of about 125 acre-feet. The Holland mine, on the East Fork, operates a dam having a working capacity of about 40 acre-feet. At the beginning of the season, in April, these dams fill and "shoot" about once an hour; at the end of the season, in July, once in 20 or 24 hours. During high water these "floods" are hardly perceptible, but late in the season their effect is pronounced. An effort is made to secure gage readings when the flow is normal.

ACCURACY.—No discharge measurements were secured since September, 1913. The 1912–13 rating curve was used till station was discontinued. The gage-height record, on account of the operation of the self-shooting dam, is subject to some error. Otherwise the results are good.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Digitized by Google

Daily discharge, in second-feet, of Coffee Creek at Coffee, Cal., for the period Oct. 1–21, 1914.

Day.	Oct.	Day.	Oct.
1	34	11	95
2	34	12	88
3	34	13	48
4	34	14	48
5	34	15	81
6	34	16	95
7	34	17	81
8	58	18	69
9	210	19	69
10	152	20	58
		21	39

NOTE.—Discharge determined from a fairly well defined rating curve. Mean discharge Oct. 1–21, 68.0 second-feet; total run-off, 2,830 acre-feet.

SMITH RIVER BASIN.

MIDDLE FORK OF SMITH RIVER NEAR CRESCENT CITY, CAL.

LOCATION.—In the NE. ¼ SE. ¼ sec. 20, T. 17 N., R. 2 E., at highway bridge 800 feet above junction of North and Middle forks, one-eighth mile east of Gasquet, and 14 miles northeast of Crescent City, Del Norte County.

DRAINAGE AREA.—Approximately 146 square miles.

RECORDS AVAILABLE.—September 8, 1911, to September 30, 1915 (not complete).

GAGE.—Chain gage attached to downstream guardrail of bridge. May 26, 1913, an inclined staff in two sections was installed on right bank 60 feet upstream from bridge. Original datum was not maintained. Chain gage is read during low water when staff gage can not be read. Gage is read once a day by A. W. Lewis.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Rough; composed of boulders and gravel; somewhat shifting. Both banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 15.0 feet at 8.30 a. m. February 1 (discharge, 10,800 second-feet); minimum stage recorded, 3.60 feet (chain gage) at 5 p. m. August 29 and 8 a. m. August 30 (discharge, 50 second-feet).

1911–1915: Maximum stage recorded, 17.1 feet at 8 a. m. February 17, 1912 (discharge, 13,900[1] second-feet, determined from extension of rating curve and may be subject to errors); minimum stage recorded, 3.60 feet (chain gage) at 5 p. m. August 29 and 8 a. m. August 30, 1915 (discharge, 50 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Results fair for the chain gage (low water) and excellent for the staff gage.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Middle Fork of Smith River near Crescent City, Cal., during the year ending Sept. 30, 1915.

[Made by Charles Leidl.]

Date.	Gage height.		Discharge.	Date.	Gage height.		Discharge.
	Chain gage.	Staff gage.			Chain Gage	Staff Gage	
	Feet.	*Feet.*	*Sec.-ft.*		*Feet.*	*Feet.*	*Sec.-ft.*
Oct. 18	5.44	5.64	510	Oct. 20	7.25	7.42	1,450
19	11.00	11.00	5,380				

[1] Discharge published in Water-Supply Paper 391 is in error.

Digitized by Google

Daily discharge, in second-feet, of Middle Fork of Smith River near Crescent City, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	91	760	685	785	10,800	950	785	315	505	.....	68	60
2	.....	.....	685	868	5,380	868	1,200	280	465	140	70	56
3	.....	405	868	840	4,990	785	1,570	265	425	140	66	62
4	.....	350	840	1,340	3,540	760	1,070	250	405	136	.....	54
5	.....	.....	895	1,070	2,150	685	868	250	385	132	.....	56
6	.....	.....	1,070	1,650	1,570	660	.....	.....	385	145	.....	58
7	.....	590	1,200	2,060	1,570	590	.....	250	385	165	.....	60
8	80	.....	1,650	7,490	1,420	568	.....	280	350	140	.....	58
9	80	.....	3,420	3,660	1,570	.....	568	350	332	140	.....	60
10	385	590	1,890	2,150	1,200	.....	545	545	.....	124	.....	58
11	505	568	1,200	1,490	1,070	.....	525	568	.....	110	.....	.....
12	315	545	950	1,270	1,010	505	590	525	.....	104	.....	58
13	.....	635	710	1,890	785	612	685	425	.....	100	.....	62
14	.....	280	660	4,620	735	785	.....	545	250	100	.....	60
15	.....	425	545	2,960	635	760	.....	660	250	100	60	60
16	.....	280	505	.....	635	660	.....	545	250	.....	61	56
17	.....	.....	465	.....	1,200	685	568	590	235	.....	62	58
18	.....	.....	.....	.....	1,270	685	.....	1,890	220	.....	61	55
19	.....	.....	425	.....	1,140	612	.....	1,810	.....	.....	59	55
20	.....	.....	.....	.....	1,070	612	.....	1,070	.....	.....	61	55
21	.....	.....	350	.....	950	635	.....	868	.....	.....	60	54
22	.....	.....	.....	.....	1,490	685	.....	760	.....	.....	56	59
23	.....	.....	.....	.....	1,730	685	.....	735	.....	.....	.....	61
24	.....	.....	.....	.....	1,810	.....	.....	1,140	.....	68	.....	70
25	.....	.....	.....	545	1,650	545	.....	1,200	.....	73	.....	65
26	.....	.....	.....	505	1,270	505	.....	1,010	.....	72	60	62
27	.....	250	895	505	1,200	485	350	895	.....	73	58	62
28	.....	735	.....	590	1,140	590	385	785	.....	70	58	65
29	.....	1,200	568	635	.....	612	405	685	.....	69	52	.....
30	.....	868	505	685	.....	612	350	635	.....	73	52	.....
31	205	.....	525	.....	.....	840	.....	545	.....	72	58	.....

NOTE.—Discharge determined from a fairly well defined rating curve for the chain gage and a curve well defined below 8,000 second-feet for the staff gage.

NORTH FORK OF SMITH RIVER NEAR CRESCENT CITY, CAL.

LOCATION.—In the SW. ¼ NE. ¼ sec. 20, T. 17 N., R. 2 E., half a mile northeast of Gasquet, half a mile above junction of North and Middle forks, and about 15 miles northeast of Crescent City, Del Norte County.

DRAINAGE AREA.—Approximately 81 square miles.

RECORDS AVAILABLE.—September 8, 1911, to September 30, 1915 (incomplete).

GAGE.—Staff in four sections on left bank; read once a day by A. W. Lewis. The original gage was washed out November 15, 1911. Its datum was not referenced. Present gage installed December 5, 1911.

DISCHARGE MEASUREMENTS.—Made from car and cable at gage or by wading.

CHANNEL AND CONTROL.—Rough; composed of boulders and gravel. Control has not shifted since the present gage was installed. Both banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 20.2 feet at 8.30 a. m. January 8 (discharge, 12,000 second-feet); minimum stage recorded, 8.54 feet, September 18 to 23 and 28 (discharge, 65 second-feet).

1911–1915: Maximum stage recorded, 26.5 feet in the early morning of February 17, 1912 (discharge, 27,000 second-feet, determined from extension of rating curve, and may be subject to error); minimum stage recorded, 3.45 feet (original datum), November 4, 1911 (discharge, 64 second-feet).

Digitized by Google

DIVERSIONS.—None.
REGULATION.—None.
ACCURACY.—Results excellent for days when gage was read.
COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of North Fork of Smith River near Crescent City, Cal., during the year ending Sept. 30, 1915.

[Made by Charles Leidl.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 18	13.32	1,970	Oct. 20	14.45	3,010
19	19.30	10,300			

Daily discharge, in second-feet, of North Fork of Smith River near Crescent City, Cal., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	252	.....	1,260	.....	.....	1,480	1,480	306	665	157	96	71
2	.....	.....	2,100	1,730	.....	1,200	2,100	.....	665	.....	96	71
3	.....	.....	2,580	.....	.....	1,080	3,100	278	590	148	96	70
4	.....	790	2,580	2,680	.....	1,030	2,000	265	555	148	.....	70
5	.....	.....	2,680	2,000	.....	880	1,400	252	520	148	.....	70
6	.....	.....	2,680	3,210	.....	835	.....	.....	.....	217	.....	68
7	.....	.....	2,680	3,760	.....	.....	.....	228	424	217	.....	68
8	252	.....	.....	12,000	.....	.....	.....	228	424	217	.....	68
9	278	.....	7,120	5,090	.....	.....	745	.....	.....	217	.....	70
10	1,030	.....	2,680	.....	.....	.....	705	930	.....	148	.....	70
11	1,330	.....	2,280	2,190	.....	.....	590	1,140	.....	.....	.....	.....
12	835	.....	1,640	2,000	1,030	625	625	1,080	.....	132	.....	68
13	.....	.....	.....	4,960	.....	835	1,030	835	.....	132	.....	68
14	.....	.....	1,080	7,280	.....	.....	.....	2,280	.....	132	.....	68
15	.....	.....	930	3,100	.....	1,330	.....	2,100	292	132	.....	68
16	.....	.....	880	.....	.....	1,030	.....	.....	292	.....	81	67
17	.....	.....	790	.....	.....	880	.....	1,260	278	.....	81	67
18	.....	.....	.....	.....	2,000	1,260	.....	4,480	252	.....	81	65
19	.....	.....	665	.....	1,910	1,030	.....	3,210	240	.....	77	.....
20	.....	.....	.....	.....	1,730	930	.....	2,000	228	.....	77	65
21	.....	.....	625	.....	.....	.....	.....	1,400	228	.....	74	65
22	.....	.....	.....	.....	.....	745	.....	1,260	217	.....	.....	65
23	.....	.....	.....	.....	4,240	665	.....	.....	.....	.....	.....	65
24	.....	.....	.....	.....	3,430	.....	.....	2,680	217	.....	.....	80
25	.....	.....	.....	745	2,680	590	.....	3,650	217	.....	.....	68
26	.....	.....	.....	665	2,000	520	.....	2,190	206	96	.....	68
27	.....	.....	.....	665	1,560	520	.....	1,820	196	96	74	68
28	.....	1,910	.....	835	.....	.....	320	1,330	176	96	74	65
29	.....	.....	.....	930	.....	665	320	1,030	166	96	.....	.....
30	.....	1,640	.....	930	.....	1,080	306	.....	166	96	73	.....
31	.....	.....	.....	.....	.....	2,190	.....	790	.....	96	73	.....

NOTE.—Discharge determined from a rating curve well defined below 13,000 second-feet.

Digitized by Google

MISCELLANEOUS MEASUREMENTS.

Miscellaneous discharge measurements in Pacific slope drainage basins for the year ending Sept. 30, 1915.

Streams south of San Francisco Bay.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
1915.				*Feet.*	*Sec.-ft.*
Jan. 19	Tia Juana River	Pacific Ocean	2½ miles above Tia Juana, Mexico		0.8
Apr. 6	do	do	Tia Juana, Mexico		44
10	do	do	do		36
6	do	do	Mouth, near Nestor, Cal		37
10	do	do	do		26
5	Cottonwood Creek	Tia Juana River	Marron Valley, Cal	0.30	12
7	San Diego River	Pacific Ocean	Above Boulder Creek, near Lakeside, Cal.		22
July 10	do	do	do		6.6
Mar. 31	do	do	El Capitan Grande dam site, three-eighths mile below mouth of Chocolate Creek.		52
Apr. 7	do	do	do		33
14	do	do	do		20
1914.					
Oct. 16	San Diego flume	Diverts from San Diego River.	Just below Chocolate siphon, near Lakeside, Cal.	.25	1.6
17	do	do	do	.29	2.0
1915.					
Jan. 28	San Diego flume	Diverts from San Diego River.	Just below Chocolate siphon, near Lakeside, Cal.	.90	11.6
Feb. 6	do	do	do	.90	12.1
10	do	do	do	1.12	16.8
Mar. 31	do	do	do	1.20	19.6
Apr. 7	do	do	do	1.20	19.1
14	do	do	do	1.30	23
1914.					
Oct. 17	San Diego flume	Diverts from San Diego River.	Above inflow from El Monte pump, near Lakeside, Cal.		1.6
17	do	do	Below inflow from El Monte pump, near Lakeside, Cal.		2.0
1915.					
Apr. 3	San Diego flume	Diverts from San Diego River.	Grossmont, Cal	1.00	16.4
Mar. 31	South Fork of San Diego River.	San Diego River	300 feet above mouth, near Alpine, Cal.		16
Apr. 7	do	do	do		15
14	do	do	do		7.4
Mar. 31	Chocolate Creek	do	300 feet above mouth, near Lakeside, Cal.		2.3
Apr. 7	do	do	do		1.5
14	do	do	do		1.2
3	Alvarado Creek	do	600 feet above mouth, near San Diego, Cal.		[a] 12
10	East San Pasqual ditch.	Santa Ysabel Creek.	Headgate near Escondido, Cal	4.41	8.0
July 22	Canada Aqua Caliente.	San Luis Rey River.	600 feet above hot springs, near Warner Springs, Cal.		.4
1914.					
Oct. 16	Big Lake Creek	San Luis Rey River.	Near Warner Springs, Cal	2.23	.1
1915.					
Apr. 19	Big Lake Creek	San Luis Rey River.	Near Warner Springs, Cal		.05
June 28	do	do	do	2.50	.05
Mar. 13	Buena Vista Creek	do	Monkey Hill, 6 miles southwest of Warner Springs, Cal.	1.85	1.3
Apr. 19	do	do	do		.3
June 28	do	do	do	1.63	.05
July 11	Temecula Creek	Santa Margarita River.	Pauba grant, Cal., just below junction with Arroyo-Seco.		2.4
Sept. 26	do	do	2½ miles above railway station at Fallbrook, Cal.		3.6
July 11	Arroyo-Seco	Temecula Creek	Just above junction with Temecula Creek, Pauba grant, Cal.		.1
Apr. 15	Plunge Creek	Santa Ana River	Highway bridge near East Highlands, Cal.		6.0
14	Waterman Canyon Creek.	do	Old U. S. G. S. gaging station in SW. ¼ sec. 2, T. 1 N., R. 4 W., 6 miles north of San Bernardino, Cal.	2.03	5.4
16	do	do	do	1.70	2.8

[a] Flow includes waste from San Diego flume and leakage from La Mesa Reservoir.

Digitized by Google

Miscellaneous discharge measurements in Pacific slope drainage basins for the year ending Sept. 30, 1915—Continued.

Streams south of San Francisco Bay—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
1915.					
July 16	Devil Canyon Creek.	Santa Ana River..	Old U. S. G. S. gaging station at mouth of canyon in SE. ¼ NE. ¼ sec. 6, T. 1 N., R. 4 W., near San Bernardino, Cal.	.....	1.4
16	Cajon Creek.....	.....do.....	Cajon, Cal.....	.....	1.2
17	Cucamonga Creek..	.....do.....	Just above intake of Cucamonga Water Co.'s canal, near Ioamosa, Cal.	.....	5.9
5	San Dimas Creek..	San Gabriel River.	30 feet above intake of San Dimas Land & Water Co.'s canal near San Dimas, Cal.	.....	1.5
5	Dalton Creek.....	.....do.....	Intake of Glendora Water Co.'s canal near Glendora, Cal.	.....	.3
Aug. 13	Santa Anita River.	San Gabriel River.	Roberts camp, 5 miles from Sierra Madre, Cal.	.....	.9
13	Little Santa Anita River.	.....do.....	1¾ miles north of Sierra Madre, Cal..	.....	.2
Mar. 23	Pacoima Creek....	Los Angeles River.	Mouth, near San Fernando, Cal.....	.....	12
July 4	.....do.....	.....do.....	.....do.....	.....	1.6
4	Tujunga Creek.....	.....do.....	One-half mile above Gold Canyon, 4 miles northeast of Sunland, Cal.	.....	9.8
Mar. 24	.....do.....	.....do.....	Mouth of canyon near Sunland, Cal.	.....	59
24	.....do.....	.....do.....	Southern Pacific R. R. bridge near San Fernando, Cal.	.....	30
July 4	Little Tujunga Creek.	Tujunga Creek....	Half a mile above Gold Creek near Sunland, Cal.	.....	.2
Mar. 24	.....do.....	.....do.....	Mouth of canyon near Sunland, Cal.	.....	3.6
Feb. 25	Millard Canyon Creek.	Arroyo-Seco.....	100 feet above mouth near Pasadena, Cal.	.....	4.4
Mar. 15	.....do.....	.....do.....	.....do.....	.....	1.8
Aug. 29	Sespe Creek.....	Santa Clara River.	East line sec. 31, T. 6 N., R. 20 W., 12 miles northwest of Sespe, Cal.	.....	151
Sept. 12	.....do.....	.....do.....	Just above mouth of Hot Springs Creek, 12 miles northwest of Sespe, Cal.	.....	8.1
11	.....do.....	.....do.....	Between Hot Springs and Alder creeks, 12 miles north of Sespe, Cal.	.....	11
1914.					
Jan. 7	Sespe Creek.....	Santa Clara River.	Cable at Bradfield's camp near Sespe, Cal.	.....	31
10	.....do.....	.....do.....	.....do.....	.....	27
13	.....do.....	.....do.....	.....do.....	.....	28
1915.					
Jan. 7	Sespe Creek.....	Santa Clara River.	Cable at Bradfield's camp near Sespe, Cal.	5.89	103
Sept. 8	.....do.....	.....do.....	Just below Little Sespe Creek, 3 miles north of Sespe, Cal.	.....	6.2
8	.....do.....	.....do.....	600 feet below Southern Pacific R. R. bridge, half a mile southeast of Sespe, Cal.	.....	5.0
6	West Fork of Sespe Creek.	Sespe Creek.....	Just above mouth near Sespe, Cal..	.....	1.5
Apr. 27	Hot Springs Creek.	.....do.....	Just above mouth, 12 miles northwest of Sespe, Cal.	.....	6.4
Sept. 11	.....do.....	.....do.....	.....do.....	.....	1.5
1914.					
Oct. 26	Alder Creek.....	Sespe Creek.....	Half a mile above mouth, 12 miles north of Sespe, Cal.	.....	1.1
1915.					
Apr. 29	Alder Creek.....	Sespe Creek.....	Half a mile above mouth, 12 miles north of Sespe, Cal.	.....	7.7
Sept. 11	.....do.....	.....do.....	.....do.....	.....	1.0
8	Tar Creek.....	.....do.....	Mouth, 6 miles north of Sespe, Cal..	.....	.0
8	Coldwater Canyon Creek.	.....do.....	Mouth, 4 miles north of Sespe, Cal..	.....	.5
8	Pine Canyon Creek	.....do.....	Mouth, 3½ miles north of Sespe, Cal..	.....	1.3
8	Little Sespe Creek.	.....do.....	Mouth, 3 miles north of Sespe, Cal..	.....	.0
8	Fillmore canal.....	Diverts from Sespe Creek.	Few miles northwest of Fillmore, near Sespe, Cal.	.....	12
13	San Lorenzo River.	Pacific Ocean.....	400 feet above Southern Pacific R. R. bridge, 2 miles below Felton, Cal.	.....	37
13	.....do.....	.....do.....	50 feet above bridge at powder mill, 2½ miles above Santa Cruz, Cal.	.....	42

Digitized by Google

Miscellaneous discharge measurements in Pacific slope drainage basins for the year ending Sept. 30, 1915—Continued.

Kern River basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
1914.				*Feet.*	*Sec.-ft.*
Oct. 3	Kern River	Kern basin	70 feet below mouth of Little Kern River, in sec. 5, T. 21 S., R. 33 E., 29 miles north of Kernville, Cal.		328
8	do	do	In sec. 4, T. 25 S., R. 33 E., about 5 miles above Kernville, Cal.		329
9	do	do	Old U. S. G. S. gaging station, half a mile north of Isabella, Cal.	0.85	7.5
10	do	do	1½ miles below Borel power house, below Borel, Cal.		385
10	do	do	Below intake of flume to plant No. 1, at Democrat Springs, Cal.		6.2
11	do	do	500 feet above spillway of plant No. 1, at Democrat Springs, Cal.		17
1	Rattlesnake Creek	Kern River	1 mile above mouth in sec. 3, T. 21 S., R. 33 E., 29 miles north of Kernville, Cal.		11
1	Little Kern River	do	20 feet above Trout Meadow trail ford, sec. 12, T. 20 S., R. 32 E., 34 miles north of Kernville, Cal.		23
3	do	do	400 feet above mouth in sec. 5, T. 21 S., R. 33 E., 29 miles north of Kernville, Cal.		25
3	Freeman Creek	do	50 feet below Trout Meadow trail, in sec. 35, T. 20 S., R. 32 E., 30 miles north of Kernville, Cal.		2.4
5	Peppermint Creek	do	300 feet below lower trail crossing, in sec. 36, T. 21 S., R. 32 E., 25 miles north of Kernville, Cal.		2.2
5	Durrwood Creek	do	400 feet above mouth, 24 miles north of Kernville, Cal.		2.0
6	Dry Creek	do	500 feet below lower trail crossing, in sec. 22, T. 22 S., R. 32 E., 21 miles north of Kernville, Cal.		6.5
6	Little Dry Creek	do	1,000 feet above mouth, 19 miles north of Kernville, Cal.		1.6
6	Brush Creek	do	200 feet above trail crossing, in sec. 36, T. 22 S., R. 32 E., 19 miles north of Kernville, Cal.		3.4
1915.					
June 14	Brush Creek	Kern River	200 feet above trail crossing, in sec. 36, T. 22 S., R. 32 E., 19 miles north of Kernville, Cal.		35
1914.					
Oct. 7	Tobias Creek	Kern River	2 miles above mouth, 15 miles northwest of Kernville, Cal.		2.2
1915.					
June 13	Tobias Creek	Kern River	2 miles above mouth, 15 miles northwest of Kernville, Cal.		13
1914.					
Oct. 8	Salmon Creek	Kern River	150 feet above road, in sec. 30, T. 23 S., R. 33 E., 13 miles north of Kernville, Cal.		3.2
1915.					
June 15	Salmon Creek	Kern River	150 feet above road, in sec. 30, T. 23 S., R. 33 E., 13 miles north of Kernville, Cal.		18
1914.					
Oct. 8	Corral Creek	Kern River	Near mouth, 11 miles north of Kernville, Cal.		.5
9	Kern River Power Co.'s canal.	Diverts from Kern River.	Old U. S. G. S. gaging station at Beattie ranch, three-fourths mile below Kernville, Cal.	5.30	335
1915.					
June 17	South Fork of Kern River.	Kern River	Old U. S. G. S. gaging station, in SW. ¼ sec. 24, T. 25 S., R. 35 E., 5 miles northeast of Onyx, Cal.	2.32	189
1914.					
Oct. 9	South Fork of Kern River.	Kern River	Old U. S. G. S. gaging station at Isabella, Cal.	.80	42
8	Powers ditch	Diverts from South Fork of Kern River.	Onyx, Cal.		1.1
10	Clear Creek	Kern River	County highway bridge, 1½ miles below Borel, Cal.		.2
10	Kern River Power Co.'s flume.	Diverts from Kern River.	Opposite flume tender's house at Democrat Springs, Cal.		373

Digitized by Google

Miscellaneous discharge measurements in Pacific slope drainage basins for the year ending Sept. 30, 1915—Continued.

Tulare Lake basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
1915. Feb. 1	Bear Creek	North Fork of Tule River.	Below mouth of Rancheria Creek, near Springville, Cal.		9.7
1	Rancheria Creek	Bear Creek	Mouth, near Springville, Cal.		4.6

San Joaquin River basin.

1915. Sept. 23	San Joaquin River	Suisun Bay	600 feet below intake of Gravely ford canal near Mendota, Cal.		610
22	do	do	Above intake of Lone Willow slough near Mendota, Cal.	3.60	580
21	do	do	200 feet below Miller & Lux dam near Mendota, Cal., in NE. ¼ sec. 19, T. 13 S., R. 15 E.		59
23	do	do	400 feet below bridge at Firebaugh, Cal.		48
23	do	do	800 feet below Temple slough in SE. ¼ sec. 12, T. 11 S., R. 13 E.		16
25	do	do	One-fourth mile above Merced River near Newman, Cal.		111
22	Lone Willow slough.	San Joaquin River	White house near Mendota, Cal., in NW. ¼ sec. 25, T. 13 S., R. 15 E.	1.62	37
22	Columbia canal	Diverts from Lone Willow slough.	White house near Mendota, Cal., in the NW. ¼ sec. 23, T. 13 S., R. 15 E.	1.59	15.5
1914. Apr. 20	Kings River	San Joaquin River	Hardwick Bridge, half a mile west of Hardwick, Cal.	16.7	2,270
21	do	do	do	15.5	3,160
22	do	do	do	16.2	2,610
21	do	do	Lemoore road crossing near Lemoore, Cal.		a 80
Jan. 27	do	do	Highway bridge half a mile west of Stratford, Cal.		2,080
28	do	do	do		4,450
29	do	do	do		5,150
31	do	do	do		1,970
May 26	do	do	do		1,390
13	do	do	Empire weir, 1½ miles north of point discharge into Tulare Lake, Cal.	4.8	350
18	do	do	do	7.1	1,000
June 4	do	do	do	9.9	2,600
8	do	do	do	7.05	1,600
1915. June 7	Kings River (San Joaquin branch).	San Joaquin River	Wasteway of Crescent canal at north end of Summit Lake, Cal.	5.75	1,140
1914. Jan. 28	Kings River (San Jaoquin branch).	San Joaquin River	Three small highway bridges across the three branches at Elkhorn Grade, in sec. 3, T. 17 S., R. 18 E.	11.7	8,540
29	do	do	do	10.7	6,170
30	do	do	do	10.0	4,600
31	do	do	do	9.5	4,060
Apr. 19	do	do	do	4.6	1,070
21	do	do	do	5.8	1,620
23	do	do	do	6.4	1,850
May 26	do	do	do		4,510
June 3	do	do	do	11.16	6,420
4	do	do	do	11.36	6,620
July 6	do	do	do	9.75	3,710
1915. Mar. 2	Kings River (San Joaquin branch).	San Joaquin River	Three small highway bridges across the three branches at Elkhorn Grade, in sec. 3, T. 17 S., R. 18 E.	3.75	868
June 7	do	do	do	10.35	5,320
1914. Apr. 23	Murphy slough	Kings River	2 miles northwest of Riverdale, Cal.		215
24	Crescent canal	Diverts from Kings River.	New weir at head of canal		374
22	Zalda canal slough.	do	1,500 feet below Lemoore road, near Lemoore, Cal.	1.5	2,330
May 27	do	do	do		3,450

a Estimated by flood control division of department of engineering of State of California.

Digitized by Google

Miscellaneous discharge measurements in Pacific slope drainage basins for the year ending Sept. 30, 1915—Continued.

San Joaquin River basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
1914. Apr. 21	Sand slough	Diverts from Zalda canal slough.	1½ miles south of Crescent weir, Cal.		496
1915. Sept. 21	San Joaquin and Kings River canal.	Diverts from San Joaquin River.	Head gate near Mendota, Cal., in NE. ¼ sec. 24, T. 13 S., R. 14 E.	9.09	559
21	Helm canal	do	Intake near Mendota, Cal., in NE. ¼ sec. 19, T. 13 S., R. 15 E.		14.9
21	Helm ditch	do	do		5.0
23	Temple slough	do	Head gate near Dos Palos, Cal., in SW. ¼ sec. 12, T. 11 S., R. 13 E.	1.45	74
24	East side canal	do	Head gate near Los Banos, Cal., in NE. ¼ sec. 17, T. 9 S., R. 12 E.	3.41	10.1
Aug. 21	Merced River	San Joaquin River	Top of Nevada Falls near Yosemite, Cal.	4.81	103
Sept. 28	do	do	do	3.90	20
1914. Nov. 9	Merced River	San Joaquin River	Above south fork at Clearing House, Cal.		76
10	do	do	Old U. S. G. S. gaging station, 2 miles above dam at Merced Falls, Cal.		107
1915. Aug. 21	Illilouette Creek	Merced River	Top of falls near Yosemite, Cal	4.45	18
Sept. 28	do	do	do	4.09	6.7
1914. Nov. 9	South Fork of Merced River.	Merced River	1,400 feet above mouth, near South Fork station, Cal.		35
1913. Oct. 22	South Fork of Merced River.	Merced River	500 feet above mouth		12
1915. Apr. 5	Corral Creek	Tuolumne River	At abandoned U. S. G. S. gaging station, 1 mile west of Jawbone, Cal.	.93	3.7
16	do	do	do	.82	2.7
21	Hazel Green Creek	South Fork of Tuolumne River.	Mouth, near Sequoia, Cal		2.1
July 7	Golden Rock ditch.	Diverts from South Fork of Tuolumne River.	Above upper end of siphon near Hamilton, Cal.		9.3
7	do	do	Below waste gate, Coulterville road, near Hobern, Cal.		6.2
5	Golden Rock ditch. (upper ditch).	Diverts from Middle Fork of Tuolumne River.	50 feet below head gate, in se. 5, T. 1 S., R. 20 E.		4.4
5	do	do	Upper cabin above Ackerson Meadow, Cal., in sec. 7, T. 1 S., R. 20 E.		4.6
5	do	do	Just below entrance of small tributary at northwest corner of sec. 18, T. 1 S., R. 20 E.		5.0

Sacramento River basin.

1914. Jan. 15	Sacramento River	San Francisco Bay	Colusa, Cal	24.4	49,000
Mar. 2	do	do	do	20.1	40,600
1915. Feb. 11	Sacramento River	San Francisco Bay	Colusa, Cal	22.0	61,500
16	do	do	do	17.0	31,000
1914. Jan. 16	Sacramento River	San Francisco Bay	Meridian, Cal	49.8	39,800
1915. Feb. 4	Sacramento River	San Francisco Bay	Meridian, Cal	64.9	51,400
1914. Mar. 1	Sacramento River	San Francisco Bay	Above Tisdale weir, Cal	46.9	35,600
Feb. 28	do	do	Below Tisdale weir, Cal	47.1	22,500

Digitized by Google

Miscellaneous discharge measurements in Pacific slope drainage basins for the year ending Sept. 30, 1915—Continued.

Sacramento River basin—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
1915.				*Feet.*	*Sec.-ft.*
Jan. 19	Sacramento River.	San Francisco Bay	Knights Landing, Cal.	17.2	22,900
Feb. 5	.....do.....	.....do.....	.....do.....	18.9	17,300
1914.					
Jan. 27	Sacramento River.	San Francisco Bay	Sacramento, Cal.	27.7	76,300
Mar. 3	.....do.....	.....do.....	.....do.....	19.0	49,100
1915.					
Feb. 5	Sacramento River.	San Francisco Bay	Sacramento, Cal.	24.6	70,900
6	.....do.....	.....do.....	.....do.....	24.4	61,700
1908.					
Feb. 25	Fall River.....	Pit River.....	Whipple Bridge near Fall River Mills, Cal.	1.00	730
22	.....do.....	.....do.....	Glenburn Bridge near Fall River Mills, Cal.	.99	1,620
23	.....do.....	.....do.....	.....do.....	.99	1,620
26	.....do.....	.....do.....	Bill Neadys Bridge near Fall River Mills, Cal.	1.00	1,600
21	.....do.....	.....do.....	Town bridge at Fall River Mills, Cal.	1.00	1,520
26	.....do.....	.....do.....	.....do.....	1.00	1,570
27	Bear Creek.....	Fall River.....	Harden's ranch at bridge on Burtle road, Cal.	.....	28
24	Tule River.....	.....do.....	Bridge above junction with Fall River, Cal.	1.00	940
1915.					
July 22	Hat Creek.....	Pit River.....	200 feet above upper big spring near Hat Creek, Cal.	.....	39
24	.....do.....	.....do.....	.....do.....	.....	41
22	.....do.....	.....do.....	1,200 feet below ranger station near Hat Creek, Cal.	.....	195
24	.....do.....	.....do.....	.....do.....	.....	198
24	.....do.....	.....do.....	500 feet below Hall ranch house near Hat Creek, Cal.	.....	201
20	.....do.....	.....do.....	Bridge at Cassel, Cal.	.....	359
20	.....do.....	.....do.....	.....do.....	.....	362
21	Rising River.....	Hat Creek.....	600 feet below abandoned U. S. G. S. gaging station in sec. 8, T. 35 N., R. 4 E., 1¼ miles south of Cassel, Cal.	1.16	322
Apr. 21	Nelson Creek.....	Pit River.....	Half a mile above mouth, near Henderson, Cal.	.....	388
Feb. 23	Colusa Basin.....	Sacramento River.	Outlet of basin, 2 miles north of Knights Landing, Cal.	40.8	20,200
24	.....do.....	.....do.....	.....do.....	40.7	21,000
25	.....do.....	.....do.....	.....do.....	40.7	20,200
26	.....do.....	.....do.....	.....do.....	40.7	19,500
1914.					
Jan. 9	Butte Slough.....	Sacramento River.	Mawson bridge, Cal.	.....	38,600
17	.....do.....	.....do.....	Northern Electric Railroad bridge, Cal.	.....	63,800
18	.....do.....	.....do.....	.....do.....	.....	63,800
1915.					
Feb. 4	Butte Slough.....	Sacramento River.	Lone bridge on road between Marysville and Meridian, Cal.	9.04	174,000
12	.....do.....	.....do.....	.....do.....	4.8	35,700
1914.					
Mar. 2	Butte Slough.....	Sacramento River.	Mouth, at bridge on road between Meridian and Colusa, Cal.	58.04	6,630
1915.					
Feb. 10	Butte Slough.....	Sacramento River.	Mouth, at bridge on road between Meridian and Colusa, Cal.	59.6	8,560
1914.					
Jan. 18	Tisdale overflow...	Diverts from Sacramento River.	Tisdale weir, Cal.	48.1	14,400
Feb. 28	.....do.....	.....do.....	.....do.....	47.2	15,000
21	Feather River.....	Sacramento River.	Yuba City, Cal.	16.0	75,000
1915.					
Feb. 9	Feather River.....	Sacramento River.	Northern Electric R. R. and highway bridge on road between Yuba City and Marysville, Cal.	7.46	19,600

Digitized by Google

Miscellaneous discharge measurements in Pacific slope drainage basins for the year ending Sept. 30, 1915—Continued.

Sacramento River basin—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
1915.				*Feet.*	*Sec.-ft.*
Mar. 12	Poplar Creek	Middle Fork of Feather River.	Mouth, near Sloat, Cal		19
May 15	Hydroelectric power plant flume.	Diverts from North Fork of North Fork of Yuba River.	Downieville, Cal		[a] 27
15	do	do	do		[b] 59
1914.					
Jan. 20	Yolo Basin	Sacramento River.	Sacramento & Woodland R. R. trestle, Cal.	27.7	101,000
Feb. 26	do	do	do	30.3	128,000
1915.					
Feb. 6	do	Sacramento River.	1½ miles south of Sacramento & Woodland R. R. trestle, Cal.	28.7	110,000
1914.					
Jan. 10	South Fork of Putah River.	Sacramento River.	Southern Pacific R. R. bridge, Cal		1,220
Feb. 24	Georgianna Slough	do	Near Walnut Grove, Cal	8.7	12,100

Streams north of San Francisco Bay.

1915.					
June 28	Williamson River.	Upper Klamath Lake.	Ball ranch, near head of Klamath Marsh, Oreg.	0.53	51.4
28	do	do	Rockyford, Oreg	[c] 1.96	113
May 16	Klamath River	Pacific Ocean	Orleans, Cal	5.6	12,700
June 28	Big Spring	Klamath Marsh	Below tributary, on Charles Lenz's ranch, in sec. 22, T. 30 S. R. 8 E., Oreg.		57.2
28	Sand Creek	do	Crescent road crossing, Oreg		24.0
1914.					
Oct. 27	Spring Creek	Williamson River.	Above rapids, near mouth, Oreg	1.00	337
1915.					
June 27	Spring Creek	Williamson River.	Above rapids, near mouth, Oreg	1.02	320
Sept. 20	North Fork of Sprague River.	do	Obenchain bridge, Oreg		42.7
20	Meryl Creek	North Fork Sprague River.	Above Obenchain ranch, Oreg		8.4
Aug. 6	Five-mile Creek	do	Above Hamaker ditch intake, Oreg		25.8
18	do	do	do		24.8
Jan. 22	Brown Creek	Sprague River	Bad crossing, in sec. 14, T. 36 S. R. 12 E., Oreg.		10.7
Feb. 26	do	do	do	.45	11.3
Mar. 19	Sycan River	do	Sec. 21, T. 32, S., R. 14 E., at ZX ranch above Sycan Marsh, Oreg.		31.0
20	Choctoot Creek	Sycan River	Sec. 10, T. 32 S., R. 14 E., Oreg		13.5
Feb. 26	Snake Creek	do	Choctoot ranch, Oreg		3.2
Jan. 24	Whiskey Creek	Sprague River	Near mouth, 5 miles east of Yainax, Oreg.	1.05	13.2
Feb. 26	do	do	do	1.55	27.4
Apr. 15	do	do	do	1.32	16.9
Jan. 21	Trout Creek	do	Saddle Mountain road crossing, Oreg	.80	2.1
Apr. 12	do	do	do	1.60	7.6
1914.					
Oct. 25	Kenocanal	Link River	Intake, near Klamath Falls, Oreg	1.04	201
1915.					
Sept. 14	Spencer Creek	Klamath River	Outlet of Buck Lake, Oreg		21.0
24	do	do	do		18.8
1914.					
Nov. 1	Fort Creek	Wood River	Near Fort Klamath, in sec. 26, T. 33 S., R. 7½ E., Oreg.	1.75	90.4

[a] Day load; 5 stamp mill.
[b] Night load; lighting.
[c] On gage at discontinued station above Spring Creek.

Digitized by Google

Miscellaneous discharge measurements in Pacific slope drainage basins for the year ending Sept. 30, 1915—Continued.

Streams north of San Francisco Bay—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
1915.				*Feet.*	*Sec.-ft.*
Feb. 17	Fort Creek	Wood River	Near Fort Klamath, in sec. 26, T. 33 S., R. 7½ E., Oreg.	1.54	87.2
June 25	do	do	do	1.53	86.9
July 31	do	do	do	1.55	89.0
Aug. 2	Crooked Creek	do	Sec. 13, T. 34 S., R. 7½ E., at Klamath Agency, Oreg.	1.08	81.3
2	do	do	do	.94	74.8
June 25	Agency Spring	Crooked Creek	In power canal, at Klamath Agency, Oreg.	.....	22.3
Sept. 8	Reeve Davis Consolidated Mining Co.'s flume.	Diverts from Indian Creek.	Near Happy Camp, Cal., at old U. S. Geological Survey gaging station.	.....	5.2
1914.					
Oct. 31	Supply Creek	Trinity River	Hoopa, Cal	.....	8.9

Digitized by Google

Digitized by Google

INDEX.

A. Page.

"A" canal at Klamath Falls, Oreg..... 306-307
Accuracy, degree of..... 15-16
Ackerson Meadow, Cal., Golden Rock ditch near..... 334
Acknowledgments to those aiding..... 16
Acre-foot, definition of..... 10
Agency Spring at Klamath Agency, Oreg..... 337
Agua Caliente Creek near Warner Springs, Cal..... 69
Alameda Creek at Sunolglen, Cal..... 114-115
Alameda Creek basin, Cal., stream flow in.. 114-116
Alder Creek near Sespe, Cal..... 331
Almond, Cal., Temescal Creek near..... 54-56
Alpine, Cal., South Fork flume near..... 45-47
South Fork of San Diego River near.. 44-45, 330
Alvarado Creek near San Diego, Cal..... 330
American River at Fairoaks, Cal..... 270-272
view of..... 246
American River, Middle Fork of, near East Auburn, Cal..... 272-273
American River, North Fork of, near Colfax, Cal..... 268-270
American River, South Fork of, near Placerville, Cal..... 273-275
Appropriations, table of..... 9
Arroyo Seco at Pauba grant, Cal..... 330
near Pasadena, Cal..... 107-108
near Soledad, Cal..... 112-114
Authorization and scope of work..... 9-10
Avery, Cal., Middle Fork of Stanislaus River at Sand Bar Flat, near..... 186-187
North Fork of Stanislaus River near.. 193-194
Utica Gold Mining Co.'s canal near.... 195-197
Azusa, Cal., Pacific Light & Power Co.'s canal near..... 105-106
San Gabriel River near..... 102-105

B.

Bad crossing, Oreg., Brown Creek at..... 336
Baird, Cal., McCloud River at..... 231-232
Bakersfield, Cal., Kern River near..... 119-120
Baker Station, Cal., Relief Creek near..... 191-192
Relief reservoir near..... 190-191
Batchelder, C. L., work of..... 17
Bear Creek (Sacramento basin) on Burtle road, Cal..... 335
Bear Creek (San Joaquin basin) near Springville, Cal..... 126-127, 333
Bear River at Van Trent, Cal..... 265-267
near Colfax, Cal..... 264-265
Bear River canal near Colfax, Cal..... 267-268
Bernardo, Cal., San Dieguito River at..... 52-54
Big Bar, Cal., North Fork of Feather River at..... 238-239
Big Creek, Cal., Pitman Creek at..... 143-144

Page.

Big Creek near Big Creek, Ca..... 141-142
near Shaver, Cal..... 141-142
Big Lake Creek near Warner Springs, Cal.... 330
Big Spring near Lenz's ranch, Oreg..... 336
Black Canyon Creek near Mesa Grande, Cal.. 54
Bodfish, Cal., Erskine Creek near..... 120-121
Bonsall, Cal., San Luis Rey River at..... 67-68
Borel, Cal., Clear Creek near..... 332
Kern River near..... 332
Bostwick, Norris, work of..... 17
Boulder Creek at Cuyamaca reservoir, near Julian, Cal..... 36-38
near Lakeside, Cal..... 38-39
Briggs, R. C., work of..... 17
Brown Creek at Bad crossing, Oreg..... 336
Brownell, Cal., Lower Klamath Lake near.. 319
Brush Creek near Kernville, Cal..... 332
Buck Lake, Oreg., Spencer Creek at..... 336
Buena Vista Creek near Warner Springs, Cal. 330
Burtle road, Cal., Bear Creek on..... 335
Butt Creek at Butte Valley, Cal..... 241-242
Butte Slough at Mawson bridge, Cal..... 335
at Northern Electric Railroad bridge, Cal. 335
near Colusa, Cal..... 335
near Marysville, Cal..... 335
near Meridian, Cal..... 335
Butte Valley, Cal., Butt Creek at..... 241-242

C.

Cache Creek at Lower Lake, Cal..... 276-278
at Yolo, Cal..... 278-279
Cajon, Cal., Cajon Creek at..... 331
Calaveras River at Jenny Lind, Cal..... 202-203
California, cooperation of..... 15-16
Callahan, Cal., East Fork of Scott River at. 319-320
Scott River at..... 320-321
Canada Agua Caliente near Warner Springs, Cal..... 330
Canada Verde Creek near Warner Springs, Cal..... 70
Carrizo Creek near Warner Springs, Cal..... 72-74
Cassel, Cal., Hat Creek at..... 335
Rising River near..... 335
Castella, Cal., Sacramento River at..... 220-222
Cherry Creek near Sequoia, Cal..... 172-174
Chiloquin, Oreg., Modoc Point canal near.. 301-302
Sprague River at..... 297-299
Williamson River at..... 284-285
Chocolate Creek near Lakeside, Cal..... 330
San Diego River below..... 330
Choctoot Creek, Oreg., miscellaneous measurements on..... 336
Choctoot ranch, Oreg., Snake Creek at..... 336
Clear Creek near Borel, Cal..... 332
Clear Lake at Lakeport, Cal..... 275-276

Digitized by Google

Page.

Clearing House, Cal., Merced River at..... 334
Clements, Cal., Mokelumne River near.... 204-205
Coffee Creek at Coffee, Cal..... 326-327
Coldwater Canyon Creek near Sespe, Cal..... 331
Colfax, Cal., Bear River canal near..... 267-268
Bear River near..... 264-265
North Fork of American River near... 268-270
Columbia canal near Mendota, Cal..... 333
Colusa Basin near Knights Landing, Cal..... 335
Colusa, Cal., Butte slough near..... 335
Sacramento River at..... 334
Computations, accuracy of..... 15
Control, definition of..... 10-11
Cooperation, details of..... 16
Corral Creek at Jawbone, Cal..... 334
Near Kernville, Cal..... 332
Cosumnes River at Michigan Bar, Cal..... 212-213
North Fork of, near El Dorado, Cal.... 210-212
Cottonwood Creek (Goose Lake basin) near Lakeview, Oreg..... 217-219
Cottonwood Creek (Tia Juana basin) at Marron Valley, Cal..... 330
near Dulzura, Cal..... 18-21
Covelo, Cal., Middle Eel River near..... 282-284
Crane Valley reservoir near North Fork, Cal. 144-146
Crescent City, Cal., Middle Fork of Smith River near..... 327-328
North Fork of Smith River near..... 328-329
Crescent Mills, Cal., Indian Creek near..... 242-244
Crescent road crossing, Oreg., Sand Creek at. 336
Crescent weir, Cal., Sand Slough near..... 334
Cromberg, Cal., Middle Fork of Feather River near..... 246-247
view of..... 246
Crooked Creek at Klamath Agency, Oreg.... 337
Cucamonga Creek near Ioamosa, Cal..... 331
Current meters, view of..... 14
Cuyamaca reservoir, near Julian, Cal, Boulder Creek at..... 36-38

D.

Dalton Creek near Glendora, Cal..... 331
Data, explanation of..... 13-15
Deer Creek (Sacramento basin) near Vina, Cal..... 232-234
Deer Creek (San Joaquin basin) at Hot Springs, Cal..... 122-124
Definition of terms..... 10-11
Dehesa, Cal., Sweetwater River near..... 24-26
Democrat Springs, Cal., Kern River at..... 332
Kern River Power Co.'s flume at..... 332
Descanso, Cal., Sweetwater River near..... 23-24
Devil Canyon Creek near San Bernardino, Cal..... 331
Dinkey Creek near Ockenden, Cal..... 136
Discharge, conversion of..... 11-12
tables of..... 14
Discharge relation, definition of..... 10
Dos Palos, Cal., Temple slough near..... 334
Downieville, Cal., hydroelectric power plant flume at..... 336
North Fork of North Fork of Yuba River at..... 259-260
Drews Creek near Lakeview, Oreg..... 214-216
Drews Creek reservoir near Lakeview, Oreg. 213-214
Dry Creek near Kernville, Cal..... 332

Page.

Dulzura, Cal., Cottonwood Creek near..... 18-21
Dulzura conduit near..... 21-22
Durrwood Creek near Kernville, Cal..... 332

E.

East Auburn, Cal., Middle Fork of American River near..... 272-273
East Highlands, Cal., Plunge Creek near..... 330
East San Pasqual ditch near Escondido, Cal.. 330
Eastside canal near Los Banos, Cal..... 334
Ebert, F. C., work of..... 16
Eel River at Scotia, Cal..... 281-282
Eel River basin, Cal., stream flow in..... 281-284
El Dorado, Cal., North Fork of Cosumnes River near..... 210-212
Eleanor Creek near Sequoia, Cal..... 174-176
Elkhorn Grade, Cal., Kings River at..... 333
Emerson, C. J., work of..... 16
Enterprise, Cal., Palermo Land & Water Co.'s canal at..... 250-252
South Fork of Feather River at..... 249-250
Equivalents, table of..... 11-13
Erskine Creek near Bodfish, Cal..... 120-121
Escondido, Cal., East San Pasqual ditch near. 330
Guejito Creek near..... 56-57
West San Pasqual ditch near..... 57-59
Escondido Mutual Water Co.'s canal near Nellie, Cal..... 78-91

F.

Fairoaks, Cal., American River at..... 270-272
view of..... 246
Fall River, Cal., Tule River at..... 335
Fall River Mills, Cal., Fall River near..... 335
Fallbrook, Cal., Temecula Creek near..... 330
Feather River at Oroville, Cal..... 239-241
at Yuba City, Cal..... 335
near Marysville, Cal..... 335
Feather River, Middle Fork of, at Cromberg, Cal., view of..... 246
near Cromberg, Cal..... 246-247
near Oroville, Cal..... 247-249
Feather River, North Fork of, at Big Bar, Cal. 238-239
near Prattville, Cal..... 237-238
Feather River, South Fork of, at Enterprise, Cal..... 249-250
Felton, Cal., San Lorenzo River near..... 331
Fillmore canal near Sespe, Cal..... 331
Firebaugh, Cal., San Joaquin River at..... 333
Firestone, C. P., work of..... 16
Fivemile Creek, Oreg., discharge measurements of..... 336
Forest Home, Cal., Mill Creek at..... 97-98
Fort Creek near Fort Klamath, Oreg..... 336, 337
Fort Klamath, Oreg., Wood River at..... 302-304
Foster, Cal., San Vicente Creek at..... 47-48
Fourmile Creek near Odessa, Oreg..... 304-305
Freeman Creek near Kernville, Cal..... 332
Friant, Cal., San Joaquin River at, view of.. 58
San Joaquin River near..... 138-140

G.

"G" canal near Olene, Oreg..... 317-318
Gaging stations, distribution of..... 9-10
view of..... 14
Georgianna Slough near Walnut Grove, Cal.. 336

Digitized by Google

Page.

Glendora, Cal., Dalton Creek near 331
Golden Rock ditch near Ackerson Meadow, Cal..... 334
near Hamilton, Cal..... 334
near Hobern, Cal..... 334
near Sequoia, Cal..... 179–180
Goodyear Bar, Cal., Goodyear Creek at.... 262–264
North Fork of Yuba River at..... 257–258
Rock Creek at..... 261–262
Goodyear Creek at Goodyear Bar, Cal..... 262–264
Goose Lake basin, Oreg., stream flow in... 213–220
Grossmont, Cal., San Diego flume at..... 330
Groveland, Cal., South Fork of Tuolumne River near..... 180–181
Tuolumne River at, view of..... 166
Tuolumne River near..... 165–167
Guejito Creek near Escondido, Cal..... 56–57

H.

Hamilton, Cal., Golden Rock ditch near..... 334
Happy Camp, Cal., Indian Creek near..... 321–322
Reeve Davis flume near..... 337
Hardwick, Cal., Kings River near..... 333
Hardy, W. V., work of..... 16
Hat Creek at Cassel, Cal..... 335
at Hat Creek, Cal..... 227–228
near Hat Creek, Cal..... 335
Hazel Green Creek near Sequoia, Cal..... 334
Helm canal and ditch near Mendota, Cal..... 334
Henderson, Cal., Kosk Creek near..... 229–230
Nelson Creek near..... 335
Pit River at..... 224–226
view of..... 222
Henshaw, F. F., work of..... 17
Hetch Hetchy cabin, near Sequoia, Cal., Tuolumne River at..... 160–161
Hetch Hetchy dam site, near Sequoia, Cal., Tuolumne River at..... 162–163
Tuolumne River below..... 164–165
Hobern, Cal., Golden Rock ditch near..... 334
Hodges, P. V., work of..... 17
Hoopa, Cal., Supply Creek near..... 337
Trinity River at..... 325–326
Hot Springs, Cal., Deer Creek at..... 122–124
Hot Springs Creek near Sespe, Cal..... 331
Hubbell, J. J., work of..... 17
Hydroelectric power plant flume at Downieville, Cal..... 336

I.

Illilouette Creek near Yosemite, Cal... 153–154, 334
Indian Creek (Klamath basin) near Happy Camp, Cal..... 321–322
(Sacramento basin) near Crescent Mills, Cal..... 242–244
Ioamosa, Cal., Cucamonga Creek near..... 331
Isabella, Cal., Kern River near..... 332
South Fork of Kern River at..... 332

J.

Jawbone, Cal., Corral Creek at..... 334
Jawbone Creek near Tuolumne, Cal..... 176–177
Jenny Lind, Cal., Calaveras River at..... 202–203
Julian, Cal., Boulder Creek near..... 36–38

K.

Page.

Kaweah, Cal., North Fork of Kaweah River at..... 131–132
Kaweah River near Three Rivers, Cal.... 129–130
North Fork of, at Kaweah, Cal..... 131–132
South Fork of, near Three Rivers, Cal. 132–134
Keddie, Cal., Spanish Creek at..... 244–245
Kenol Canal near Klamath Falls, Oreg..... 336
Keno, Oreg., Klamath River at Spencer Bridge, near..... 289–292
Kern River at Democrat Springs, Co..... 332
near Bakersfield, Cal..... 119–120
near Borel, Cal..... 332
near Isabella, Cal..... 332
near Kernville, Cal..... 117–118, 332
Kern River basin, Cal., stream flow in..... 117–120
Kern River, South Fork of, at Isabella, Cal..... 332
near Onyx, Cal..... 332
Kern River Power Co.'s flume at Democrat Springs, Cal..... 332
near Kernville, Cal..... 332
Kernville, Cal., Brush Creek near..... 332
Corral Creek, near..... 332
Dry Creek near..... 332
Durrwood Creek near..... 332
Freeman Creek near..... 332
Kern River near..... 117–118, 332
Kern River Power Co.'s canal near..... 332
Little Dry Creek near..... 332
Little Kern River near..... 332
Peppermint Creek near..... 332
Rattlesnake Creek near..... 332
Salmon Creek near..... 332
Tobias Creek near..... 332
Kings County, Cal., Tulare Lake in..... 121–122
Kings River at Elkhorn Grade, Cal..... 333
at Summit Lake, Cal..... 333
at Tulare Lake, Cal..... 333
near Hardwick, Cal..... 333
near Lemoore, Cal..... 333
near Sanger, Cal..... 134–135
near Stratford, Cal..... 333
Klamath Agency, Oreg., Agency Spring at.. 337
Crooked Creek at..... 337
Klamath Falls, Oreg., "A" canal at..... 306–307
Keno Canal near..... 336
Link River at..... 286–289
Upper Klamath Lake near..... 286
Klamath Marsh, Oreg., Williamson River near..... 336
Klamath River at Orleans, Cal..... 336
at Spencer Bridge, near Keno, Oreg....289–292
near Requa, Cal..... 294–295
near Seiad Valley, Cal..... 292–293
Klamath River Basin, Cal.-Oreg., stream flow in..... 284–328
Knights Ferry, Cal., Oakdale canal near... 200–201
South San Joaquin canal near..... 198–200
Stanislaus River at..... 188–190
view of..... 166
Knights Landing, Cal., Colusa Basin near... 335
Sacramento River at..... 335
Kosk Creek near Henderson, Cal..... 229–230
Kunesh, J. F., work of..... 16

Digitized by Google

L.

La Grange, Cal., Modesto canal near..... 183–184
Tuolumne River above La Grange dam, near..... 167–169
Tuolumne River at La Grange dam, near..... 169–172
Tuolumne River near..... 169–172
Turlock canal near..... 184–186
Yosemite Power Co.'s canal near..... 181–183
La Grange dam, near La Grange, Cal., Tuolumne River at..... 169–172
Lakeport, Cal., Clear Lake at..... 275–276
Lakeside, Cal., Boulder Creek near..... 38–39
Chocolate Creek near..... 330
San Diego flume near..... 40–43, 330
San Diego River above Boulder Creek, near..... 330
San Diego River at and near..... 27–33, 330
Lakeview, Oreg., Cottonwood Creek near.. 217–219
Drews Creek near..... 214–216
Drews Creek reservoir near..... 213–214
North Drews canal near..... 216–217
Thomas Creek near..... 219–220
Lee, Lasley, work of..... 16
Leidl, Charles, work of..... 16
Lemoore, Cal., Kings River near..... 333
Zalda canal slough near..... 333
Lenz's ranch, Oreg., Big Spring near..... 336
Lewiston, Cal., Trinity River at..... 324–325
Link River at Klamath Falls, Oreg..... 286–289
Little Dry Creek near Kernville, Cal..... 332
Little Kern River near Kernville, Cal..... 332
Little Santa Anita River near Sierra Madre, Cal..... 331
Little Sespe Creek near Sespe, Cal..... 331
Little Stony Creek near Lodoga, Cal..... 235–236
Little Tujunga Creek near Sunland, Cal..... 331
Lodoga, Cal., Little Stony Creek near..... 235–236
Lompoc, Cal., Santa Ynez River near..... 110–112
Lone Willow Slough near Mendota, Cal..... 333
Lorella, Oreg., Miller Creek near..... 315–316
Los Angeles River basin, Cal., stream flow in..... 107–108
Los Banos, Cal., Eastside canal near..... 334
Lost River above Olene, Oreg..... 307–308
at Wilson Bridge, near Olene, Oreg.... 309–311
Lost River diversion canal near Olene, Oreg..... 311–313
Lower Klamath Lake near Brownell, Cal.... 319
Lower Lake, Cal., Cache Creek at..... 276–278
Lytle Creek near San Bernardino, Cal..... 99–100

M.

McCloud River at Baird, Cal..... 231–232
McGlashan, H. D., work of..... 16
Marron Valley, Cal., Cottonwood Creek at.. 330
Marysville, Cal., Butte slough near..... 335
Feather River near..... 335
Matagual Creek near Warner Springs, Cal... 76–77
Mawson bridge, Cal, Butte slough at..... 335
Mendota, Cal., Columbia canal near..... 333
Helm canal and ditch near..... 334
Lone Willow Slough near..... 333
San Joaquin and Kings River canal near. 334
San Joaquin River near..... 333
Mentone, Cal., Pacific Light & Power Co.'s canal near..... 95–97
Santa Ana River near..... 92–94

Page.

Merced River at Clearing House, Cal..... 334
above Illilouette Creek near Yosemite, Cal..... 149
at Happy Isles Bridge, near Yosemite, Cal..... 150
near Merced Falls, Cal..... 334
near Yosemite, Cal..... 334
Merced River, South Fork of, near South Fork station, Cal..... 334
near Wawona, Cal..... 158–159
Meridian, Cal., Butte Slough near..... 335
Sacramento River at..... 334
Merrill, Oreg., Tule Lake near..... 313–314
Meryl Creek above Obenchain ranch, Oreg.. 336
Mesa Grande, Cal., Black Canyon Creek near. 54
San Luis Rey River near..... 63–64
view of..... 48
Santa Ysabel Creek near..... 49–50
Michigan Bar, Cal., Cosumnes River at... 212–213
Middle Eel River near Covelo, Cal..... 282–284
Mill Creek at Forest Home, Cal..... 97–98
Millard Canyon Creek near Pasadena, Cal.... 331
Miller Creek near Lorella, Oreg..... 315–316
Miner's inch, equivalents of..... 12
Miscellaneous discharge measurements.... 330–337
Modesto canal near La Grange, Cal..... 183–184
Modoc Point canal near Chiloquin, Oreg... 301–302
Mokelumne River near Clements, Cal..... 204–205
Mokelumne River, Licking Fork of, near Railroad Flat, Cal..... 209–210
Mokelumne River, South Fork of, near Railroad Flat, Cal..... 207–208
Mokelumne River, Middle Fork of, at Westpoint, Cal..... 205–207
Morgan, J. H., work of..... 16
Murphy Slough near Riverdale, Cal..... 333
Nellie, Cal., Escondido Mutual Water Co.'s canal near..... 78–91
San Luis Rey River near..... 64–65
Nelson Creek near Henderson, Cal..... 335
Nestor, Cal., Tia Juana River near..... 17–18, 330
Newman, Cal., San Joaquin River near. 140–141, 333
North Drews canal near Lakeview, Oreg.. 216–217
North Fork, Cal., Crane Valley reservoir near..... 144–146
South Fork Creek near..... 146–147
Whiskey Creek near..... 147–148
North San Juan, Cal., Middle Fork of Yuba River near..... 252–253
Oregon Creek near..... 255–257
Northern Electric Railroad bridge, Cal., Butte slough at..... 335

O.

Oakdale canal near Knights Ferry, Cal... 200–201
Obenchain bridge, Oreg., North Fork of Sprague River at..... 336
Obenchain ranch, Oreg., Meryl Creek above. 336
Oceanside, Cal., San Luis Rey River near... 68–69
Ockenden, Cal., Dinkey Creek near..... 136
Odessa, Oreg., Fourmile Creek near..... 304–305
Olene, Oreg., "G" canal near..... 317–318
Lost River above..... 307–308
Lost River at Wilson bridge near.... 309–311
Lost River diversion canal near..... 311–313
Olene wasteway at Olene, Oreg..... 316–317

Digitized by Google

Page.
Onyx, Cal., Powers ditch at 332
South Fork of Kern River near 332
Oregon Creek near North San Juan, Cal.... 255-257
Orleans, Cal., Klamath River at 336
Oroville, Cal., Feather River at 239-241
Middle Fork of Feather River near.... 247-249

P.

Pacific Light & Power Co.'s canal near Azusa, Cal 105-106
near Mentone, Cal 95-97
Pacoima Creek near San Fernando, Cal..... 331
Pala, Cal., San Luis Rey River near 65-67
Palermo Land & Water Co.'s canal at Enterprise, Cal 250-252
Pasadena, Cal., Arroyo Seco near 107-108
Millard Canyon Creek near 331
Pauba grant, Cal., Arroyo Seco at 330
Temecula Creek at 330
Peppermint Creek near Kernville, Cal..... 332
Peterson, B. J., work of 17
Pine Canyon Creek near Sespe, Cal 331
Placerville, Cal., South Fork of American River near 273-275
Plunge Creek near East Highlands, Cal..... 330
Pitman Creek at Big Creek, Cal..... 143-144
Pit River, Henderson, Cal., view of..... 222
Pit River at Henderson, Cal..... 224-226
near Ydalpom, Cal 226-227
Poplar Creek near Sloat, Cal 336
Portersville, Cal., South Fork of Tule River near 127-128
Tule River near 124-125
Powers ditch at Onyx, Cal 332
Prattville, Cal., North Fork of Feather River near 237-238
Putah Creek at Winters, Cal..... 279-281
Putah River, Cal., South Fork of, discharge measurements of 336

R.

Railroad Flat, Cal., Licking Fork of Mokelumne River near 209-210
South Fork of Mokelumne River near.. 207-208
Ramona, Cal., Santa Maria Creek near..... 59-60
views of 58, 60
Santa Ysabel Creek near..... 51-52
view of 48
Rancheria Creek near Springville, Cal..... 333
Rattlesnake Creek near Kernville, Cal..... 332
Red Bluff, Cal., Sacramento River at, view of. 222
Sacramento River near..... 222-224
Reeve Davis Consolidated Mining Co.'s flume near Happy Camp, Cal..... 337
Relief Creek near Baker Station, Cal..... 191-192
Relief reservoir near Baker Station, Cal..... 190-191
Requa, Cal., Klamath River near..... 294-295
Rice, R. C., work of 16
Rising River near Cassel, Cal..... 335
Riverdale, Cal., Murphy Slough near..... 333
Rock Creek at Goodyear Bar, Cal..... 261-262
Rockyford, Oreg., Williamson River at..... 336
Run-off, definition of 10

S.

Sacramento, Cal., Sacramento River at..... 335
Sacramento River at Castella, Cal..... 220-222
at Colusa, Cal 334
Page.
Sacramento River at Knights Landing, Cal.. 335
at Meridian, Cal 334
at Red Bluff, Cal, view of,..... 222
at Sacramento, Cal..... 335
near Red Bluff, Cal..... 222-224
near Tisdale weir, Cal..... 334
Sacramento River basin, Cal., stream flow in 220-281
Salinas River basin, Cal., stream flow in.... 112-114
Salmon Creek near Kernville, Cal..... 332
Salmon River at Somesbar, Cal..... 322-323
San Antonio Creek near Upland, Cal.....100-102
San Bernardino, Cal., Devil Canyon Creek near 331
Lytle Creek near 99-100
Waterman Canyon Creek near..... 330
Sand Bar Flat, near Avery, Cal., Middle Fork of Stanislaus River at..... 186-187
Sand Creek at Crescent road crossing, Oreg.... 336
San Diego, Cal., Alvarado Creek near..... 330
San Diego River near..... 35-36
San Diego flume at Grossmont, Cal..... 330
near Lakeside, Cal..... 403-330
San Diego River above Boulder Creek, near Lakeside, Cal..... 330
at and near Lakeside, Cal..... 27-33
below Chocolate Creek, Cal..... 330
near Lakeside, Cal..... 330
near San Diego, Cal..... 35-36
near Santee, Cal..... 33-35
San Diego River basin, Cal., stream flow in... 27-48
San Diego River, South Fork of, near Alpine, Cal..... 44-45, 330
San Dieguito River at Bernardo, Cal..... 52-54
San Dieguito River basin, Cal., stream flow in 48-60
San Dimas Creek near San Dimas, Cal..... 331
Sand Slough near Crescent weir, Cal..... 334
San Fernando Cal., Pacoima Creek near..... 331
Tujunga Creek near..... 331
San Francisco, cooperation of..... 16
San Gabriel River basin, Cal., stream flow in..... 102-106
San Gabriel River near Azusa, Cal..... 102-105
Sanger, Cal., Kings River near..... 134-135
San Joaquin and Kings River canal near Mendota, Cal..... 334
San Joaquin River at Firebaugh, Cal..... 333
at Friant, Cal., view of..... 58
near Friant, Cal..... 138-140
near Mendota, Cal..... 333
near Newman, Cal..... 140-141, 333
near Shaver, Cal..... 137-138
near Temple Slough, Cal 333
San Joaquin River basin, Cal., stream flow in..... 137-213
San Lorenzo River near Felton, Cal..... 331
near Santa Cruz, Cal..... 331
San Luis Rey River at Bonsall, Cal..... 67-68
near Mesa Grande, Cal..... 63-64
view of..... 48
near Nellie, Cal..... 64-65
near Pala, Cal..... 65-67
near Oceanside, Cal..... 68-69
near Warner Springs, Cal..... 61-62
San Luis Rey River basin, Cal., stream Flow in..... 61-91
San Luis Rey River, West Fork of, near Warner Springs, Cal..... 71-72

Digitized by Google

Page.
San Pasqual ditch, West, near Escondido, Cal..... 57-59
Santa Ana River basin, Cal., stream flow in. 92-102
Santa Ana River near Mentone, Cal..... 92-94
Santa Anita River near Sierra Madre, Cal... 331
Santa Barbara, Cal., Santa Ynez River near 108-110
Santa Cruz, Cal., San Lorenzo River near... 331
Santa Maria Creek near Ramona, Cal..... 59-60
views of..... 58, 60
Santa Ynez River basin, Cal., stream flow in..... 108-112
Santa Ynez River near Lompoc, Cal..... 110-112
near Santa Barbara, Cal..... 108-110
Santa Ysabel Creek near Mesa Grande, Cal.. 49-50
near Ramona, Cal..... 51-52
view of..... 48
near Santa Ysabel, Cal..... 48-49
Santee, Cal., San Diego River near..... 33-35
San Vicente Creek at Foster, Cal..... 47-48
Scotia, Cal., Eel River at..... 281-282
Scott River at Callahan, Cal..... 320-321
Scott River, East Fork of, at Callahan, Cal. 319-320
Second-foot, definition of..... 10
Seiad Valley, Cal., Klamath River near.....292-293
Sequoia, Cal., Cherry Creek near..... 172-174
Eleanor Creek near..... 174-176
Golden Rock ditch near..... 179-180
Hazel Green Creek near..... 334
Tuolumne River at Hetch Hetchy dam site, near..... 162-163
at Hetch Hetchy cabin near..... 160-161
below Hetch Hetchy dam site near..... 164-165
Sequoia, Cal., South Fork of Toulumne River near..... 177-179
Sespe, Cal., Alder Creek near..... 331
Coldwater Canyon Creek near..... 331
Fillmore canal near..... 331
Hot Springs Creek near..... 331
Little Sespe Creek near..... 331
Pine Canyon Creek near..... 331
Sespe Creek near..... 331
Tar Creek near..... 331
West Fork of Sespe Creek near..... 331
Shaver, Cal., Big Creek near..... 141-142
Pitman Creek near..... 143-144
San Joaquin River near..... 137-138
Sierra Madre, Cal., Little Santa Anita River near..... 331
Santa Anita River near..... 331
Sloat, Cal., Poplar Creek near..... 336
Smartsville, Cal., Yuba River at..... 254-255
Smith River basin, Cal., stream flow in.... 328-329
Smith River, Middle Fork of, near Crescent City, Cal..... 327-328
Smith River, North Fork of, near Crescent City, Cal..... 328-329
Snake Creek at Choctoot ranch, Oreg..... 336
Soledad, Cal., Arroyo Seco near..... 112-114
Somesbar, Cal., Salmon River at..... 322-323
South Fork Creek near North Fork, Cal... 146-147
South Fork flume near Alpine Cal..... 45-47
South Fork station, Cal., South Fork of Merced River near..... 334
South San Joaquin canal near Knights Ferry, Cal..... 198-200
Spanish Creek at Keddie, Cal..... 244-245
Spencer Bridge, near Keno, Oreg., Klamath River at..... 289-292
Spencer Creek at Buck Lake, Oreg..... 336
Sprague River at Chiloquin, Oreg..... 297-299
near Yainax, Oreg..... 295-297
Sprague River, North Fork of, at Obenchain bridge, Oreg..... 336
Spring Creek, Oreg., discharge measurements of..... 336
Spring Valley aqueduct, near Sunolglen, Cal..... 116-117
Springville, Cal., Bear Creek near.....126-127, 333
Rancheria Creek near..... 333
Stanislaus River at Knights Ferry, Cal.... 188-190
view of..... 166
Stanislaus River, Middle Fork of, at Sand Bar Flat, near Avery, Cal..... 186-187
Stanislaus River, North Fork of, near Avery, Cal..... 193-194
Stanislaus River, South Fork of, at Strawberry, Cal..... 197-198
Stony Creek near Stonyford, Cal..... 234-245
Stratford, Cal., Kings River near..... 333
Strawberry, Cal., South Fork of Stanislaus River at..... 197-198
Summit Lake, Cal., Kings River at..... 333
Sunland, Cal., Little Tujunga Creek near... 331
Tujunga Creek near..... 331
Sunolglen, Cal., Alameda Creek at..... 114-115
Spring Valley Water Co.'s aqueduct near..... 116-117
Supply Creek near Hoopa, Cal..... 337
Susanna Creek near Warner Springs, Cal.... 74-75
Sweetwater River basin, Cal., stream flow in. 23-26
Sweetwater River near Dehesa, Cal..... 24-26
near Descanso, Cal..... 23-24
Sycan Marsh, Oreg., Sycan River above.... 336
near Yainax, Oreg..... 299-301
Sycan River above Sycan Marsh, Oreg..... 336

T.

Tar Creek near Sespe, Cal..... 331
Temecula Creek at Pauba grant, Cal..... 330
near Fallbrook, Cal..... 330
Temescal Creek near Almond, Cal..... 54-56
Temple Slough, Cal., San Joaquin River near. 333
Temple Slough near Dos Palos, Cal..... 334
Tenaya Creek near Yosemite, Cal..... 154-155
Thomas Creek near Lakeview, Oreg..... 219-220
Three Rivers, Cal., Kaweah River near.... 129-130
South Fork of Kaweah River near..... 132-134
Tia Juana River above Tia Juana, Mexico... 330
at Tia Juana, Mexico..... 330
near Nestor, Cal..... 17-18, 330
Tia Juana River basin, Cal., stream flow in..... 17-22, 330
Tisdale overflow at Tisdale weir, Cal..... 335
Tisdale weir, Cal., Sacramento River, near... 334
Tobias Creek near Kernville, Cal..... 332
Tompkins, H. J., work of..... 16
Trelease, M. B., work of..... 16
Trinity River at Hoopa, Cal..... 325-326
at Lewiston, Cal..... 324-325
Trout Creek, Oreg., miscellaneous measurements on..... 336
Tulare Lake basin, Cal., stream flow in.... 121-136
Tulare Lake, Cal., Kings River near..... 333

Digitized by Google

Page.
Tulare Lake in Kings County, Cal..... 121–122
Tule Lake near Merrill, Oreg..... 313–314
Tule River at Fall River, Cal..... 335
near Portersville, Cal..... 124–135
South Fork of, near Portersville, Cal.. 127–128
Tujunga Creek near San Fernando, Cal..... 331
near Sunland, Cal..... 331
Tuolumne, Cal., Jawbone Creek near..... 176–177
Tuolumne River at La Grange dam, near La Grange, Cal..... 169–172
Tuolumne River, South Fork of, near Groveland, Cal..... 180–181
near Sequoia, Cal..... 177–179
Tuolumne River at Groveland, Cal., view of.. 166
at Hetch Hetchy cabin, near Sequoia, Cal..... 160–161
at Hetch Hetchy dam site, near Sequoia, Cal..... 162–163
above La Grange dam, near La Grange, Cal..... 167–169
below Hetch Hetchy dam site, near Sequoia, Cal..... 164–165
near Groveland, Cal..... 165–167
near La Grange, Cal..... 169–172
Turlock canal near La Grange, Cal..... 184–186

U.

Upland, Cal., San Antonio Creek near.... 100–102
Upper Klamath Lake near Klamath Falls, Oreg..... 286
Utica Gold Mining Co.'s canal near Avery, Cal..... 195–197

V.

Vina, Cal., Deer Creek near..... 232–234
Van Trent, Cal., Bear River at..... 265–267

W.

Walnut Grove, Cal., Georgianna slough near. 336
Warner Springs, Cal., Agua Caliente Creek near..... 69
Big Lake Creek near..... 330
Buena Vista Creek near..... 330
Canada Agua Caliente near..... 330
Canada Verde Creek near..... 70
Carrizo Creek near..... 72–74
Matagual Creek near..... 76–77
San Luis Rey River near..... 61–62
Susanna Creek near..... 74–75
West Fork of San Luis Rey River near.. 70–72
Waterman Canyon Creek near San Bernardino, Cal..... 330
Water-power, calculation of..... 13–14
Water-stage recorders, views of..... 15, 58
Wawona, Cal., South Fork of Merced River near..... 158–159
Westpoint, Cal., Middle Fork of Mokelumne River at..... 205–207
Whiskey Creek (Klamath basin) near Yainax, Oreg..... 336
(San Joaquin basin) near North Fork, Cal..... 147–148
Williamson River at Chiloquin, Oreg..... 284–285
at Rockyford, Oreg..... 336
near Klamath Marsh, Oreg..... 336
Wilson Bridge, near Olene, Oreg., Lost River at..... 309–311
Winters, Cal., Putah Creek at..... 279–281
Wood River at Fort Klamath, Oreg..... 302–304
Work, division of..... 16–17

Y.

Yainax, Oreg., Sprague River near..... 295–297
Sycan River near..... 299–301
Whiskey Creek near..... 336
Ydalpom, Cal., Pit River near..... 226–227
Yolo Basin, Cal., discharge measurements in. 336
Yolo, Cal., Cache Creek at..... 278–279
Yosemite, Cal., Illilouette Creek near.. 153–154, 334
Merced River above Illilouette Creek near 149
Merced River at..... 151–152
Merced River near..... 334
at Happy Isles Bridge, near..... 150
Tenaya Creek near..... 154–155
Yosemite Creek at..... 156–157
Yosemite Power Co.'s canal near La Grange, Cal..... 181–183
Yuba City, Cal., Feather River at..... 335
Yuba River at Smartsville, Cal..... 254–255
Yuba River, Middle Fork of, near North San Juan, Cal..... 252–253
Yuba River, North Fork of, at Goodyear Bar, Cal..... 257–258
Yuba River, North Fork of North Fork of, at Downieville, Cal..... 259–260

Z.

Zalda canal slough near Lemoore, Cal..... 333
Zero flow, definition of..... 11

Digitized by Google

Digitized by Google

STREAM-GAGING STATIONS

AND

PUBLICATIONS RELATING TO WATER RESOURCES

PART XI. PACIFIC SLOPE BASINS IN CALIFORNIA

Digitized by Google

Digitized by Google

STREAM-GAGING STATIONS AND PUBLICATIONS RELATING TO WATER RESOURCES.

INTRODUCTION.

Investigation of water resources by the United States Geological Survey has consisted in large part of measurements of the volume of flow of streams and studies of the conditions affecting that flow, but it has comprised also investigation of such closely allied subjects as irrigation, water storage, water powers, ground waters, and quality of waters. Most of the results of these investigations have been published in the series of water-supply papers, but some have appeared in the annual reports, bulletins, professional papers, and monographs.

The results of stream-flow measurements are now published annually in 12 parts, each part covering an area whose boundaries coincide with natural drainage features as indicated below:

Part I. North Atlantic slope basins.
II. South Atlantic and eastern Gulf of Mexico basins.
III. Ohio River basin.
IV. St. Lawrence River basin.
V. Upper Mississippi River and Hudson Bay basins.
VI. Missouri River basin.
VII. Lower Mississippi River basin.
VIII. Western Gulf of Mexico basins.
IX. Colorado River basin.
X. Great Basin.
XI. Pacific slope basins in California.
XII. North Pacific slope basins, in three volumes:
A, Pacific slope basins in Washington and upper Columbia River basin.
B, Snake River basin.
C, Lower Columbia River basin and Pacific slope basins in Oregon.

HOW GOVERNMENT REPORTS MAY BE OBTAINED OR CONSULTED.

Water-supply papers and other publications of the United States Geological Survey containing data in regard to the water resources of the United States may be obtained or consulted as indicated below:

1. Copies may be obtained free of charge by applying to the Director of the Geological Survey, Washington, D. C. The edition printed for free distribution is, however, small and is soon exhausted.

Digitized by Google

2. Copies may be purchased at nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C., who will, on application, furnish lists giving prices.

3. Sets of the reports may be consulted in the libraries of the principal cities in the United States.

4. Complete sets are available for consultation in the local offices of the water-resources branch of the Geological Survey, as follows:

Albany, N. Y., Room 18, Federal Building.
Atlanta, Ga., Post Office Building.
Boston, Mass., 2500 Customhouse.
Madison, Wis., care of Railroad Commission of Wisconsin.
Helena, Mont., Montana National Bank Building.
Topeka, Kansas, 25 Federal Building.
Denver, Colo., 403 New Post Office Building.
Salt Lake City, Utah, 421 Federal Building.
Boise, Idaho, 615 Idaho Building.
Portland, Oreg., 416 Couch Building.
Tacoma, Wash., 406 Federal Building.
San Francisco, Cal., 328 Customhouse.
Los Angeles, Cal., 619 Federal Building.
Phoenix, Ariz., 417 Fleming Building.
Austin, Tex., Old Post Office Building.
Honolulu, Hawaii, 14 Capitol Building.

A list of the Geological Survey's publications may be obtained by applying to the Director of the United States Geological Survey, Washington, D. C.

STREAM-FLOW REPORTS.

Stream-flow records have been obtained at more than 3,800 points in the United States, and the data obtained have been published in the reports tabulated below:

Stream-flow data in reports of the United States Geological Survey.

[A=Annual Report; B=Bulletin; W=Water-Supply Paper.]

Report.	Character of data.	Year.
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge and descriptive information	1884 to Sept., 1890.
12th A, pt. 2	.....do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
W 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.

Digitized by Google

Stream-flow data in reports of the United States Geological Survey—Continued.

Report.	Character of data.	Year.
W 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
W 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
W 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
W 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W 75	Monthly discharge	1901.
W 82 to 85	Complete data	1902.
W 97 to 100	do	1903.
W 124 to 135	do	1904.
W 165 to 178	do	1905.
W 201 to 214	do	1906.
W 241 to 252	do	1907–8.
W 261 to 272	do	1909.
W 281 to 292	do	1910.
W 301 to 312	do	1911.
W 321 to 332	do	1912.
W 351 to 362	do	1913.
W 381 to 394	do	1914.
W 401 to 414	do	1915.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The records at most of the stations discussed in these reports extend over a series of years, and miscellaneous measurements at many points other than regular gaging stations have been made each year. An index of the reports containing records obtained prior to 1904 has been published in Water-Supply Paper 119.

The table which follows gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1915. The data for any particular station will in general be found in the reports covering the years during which the station was maintained. For example, data for Machias River at Whitneyville, Me., 1903 to 1915, are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, 301, 321, 351, 381, and 401, which contain records for the New England streams from 1903 to 1915. Results of miscellaneous measurements are published by drainage basins.

In these papers and in the following lists the stations are arranged in downstream order. The main stem of any river is determined by measuring or estimating its drainage area—that is, the headwater stream having the largest drainage area is considered the continuation of the main stream, and local changes in name and lake surface are disregarded. All stations from the source to the mouth of the main stem of the river are presented first, and the tributaries in regular order from source to mouth follow, the streams in each tributary basin being listed before those of the next basin below.

In exception to this rule the records for Mississippi River are given in four parts, as indicated on page III, and the records for large lakes are taken up in order around the rim of the lake.

Digitized by Google

Numbers of water-supply papers containing results of stream measurements, 1899–1915.

Year.	I. North Atlantic slope basins (St. John River to York River).	II. South Atlantic slope and eastern Gulf of Mexico basins (James River to the Mississippi).	III. Ohio River basin.	IV. St. Lawrence River basin.	V. Hudson Bay and upper Mississippi River basins.	VI. Missouri River basin.	VII. Lower Mississippi River basin.	VIII. Western Gulf of Mexico basins.	IX. Colorado River basin.	X. Great Basin.	XI. Pacific slope basins in California.	XII. North Pacific slope basins.		
												Pacific slope basins in Washington and upper Columbia River basin.	Snake River basin.	Lower Columbia River basin and Pacific slope basins in Oregon.
1899 [a]	35	[b] 35, 36	36	36	36	[c] 36, 37	37	37	[d] 37, 38	38, [e] 39	38, [f] 39	38	38	38
1900 [g]	47, [h] 48	48	48, [i] 49	49	49	49, [j] 50	50	50	50	51	51	51	51	51
1901	65, 75	65, 75	65, 75	65, 75	[k] 65, 66, 75	66, 75	[k] 65, 66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75
1902	82	[b] 82, 83	83	[l] 82, 83	[k] 83, 85	84	[k] 83, 84	84	85	85	85	85	85	85
1903	97	[b] 97, 98	98	97	[k] 98, 99, [m] 100	99	[k] 98, 99	99	100	100	100	100	100	100
1904	[n] 124, [o] 125, [p] 126	[p] 126, 127	128	129	[k] 128, 130	130, [q] 131	[k] 128, 131	132	133	133, [r] 134	134	135	135	135
1905	[n] 165, [o] 166, [p] 167	[p] 167, 168	169	170	171	172	[k] 169, 173	174	175, [s] 177	176, [r] 177	177	178	178	[t] 177, 178
1906	[n] 201, [o] 202, [p] 203	[p] 203, 204	205	206	207	208	[k] 205, 209	210	211	212, [r] 213	213	214	214	214
1907–8	241	242	243	244	245	246	247	248	249	250, [r] 251	251	252	252	252
1909	261	262	263	264	265	266	267	268	269	270, [r] 271	271	272	272	272
1910	281	282	283	284	285	286	287	288	289	290	291	292	292	292
1911	301	302	303	304	305	306	307	308	309	310	311	312	312	312
1912	321	322	323	324	325	326	327	328	329	330	331	332–A	332–B	332–C
1913	351	352	353	354	355	356	357	358	359	360	361	362–A	362–B	362–C
1914	381	382	383	384	385	386	387	388	389	390	391	392	393	394
1915	401	402	403	404	405	406	407	408	409	410	411	412	413	414

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39. Monthly-discharge tables for 1899 in Twenty-first Annual Report, Part IV.
[b] James River only.
[c] Gallatin River.
[d] Green and Gunnison rivers and Grand River above junction with Gunnison.
[e] Mohawk River only.
[f] Kings and Kern rivers and south Pacific slope drainage basins.
[g] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52. Monthly-discharge tables for 1900 in Twenty-second Annual Report, Part IV.
[h] Wissahickon and Schuylkill rivers to James River.
[i] Scioto River.
[j] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.
[k] Tributaries of Mississippi from east.
[l] Lake Ontario and tributaries to St. Lawrence River proper.
[m] Hudson Bay only.
[n] New England rivers only.
[o] Hudson River to Delaware River, inclusive.
[p] Susquehanna River to Yadkin River, inclusive.
[q] Platte and Kansas rivers.
[r] Great Basin in California, except Truckee and Carson river basins.
[s] Below junction with Gila.
[t] Rogue, Umpqua, and Siletz rivers only.

Digitized by Google

PRINCIPAL STREAMS.

The rivers draining into the Pacific Ocean from California include San Diego, San Dieguito, San Luis Rey, Santa Ana, San Gabriel, Los Angeles, Santa Ynez, Santa Maria, and Salinas rivers, draining areas south of San Francisco Bay; San Joaquin River, whose chief tributaries are Kings, Merced, Tuolumne, Stanislaus, Calaveras, and Mokelumne rivers; Sacramento River, whose principal tributaries are Pit, Feather, and American rivers; and Russian, Eel, Mad, Klamath, and Smith rivers, which flow into the ocean north of San Francisco Bay. Except Klamath River, which receives the drainage from a small area in Oregon, and a few streams in Oregon that flow into Goose Lake, at the head of Pit River, all the streams in this division are entirely in California.

In addition to the list of gaging stations and the annotated list of publications relating specifically to the section, these pages contain a similar list of reports that are of general interest in many sections and cover a wide range of hydrologic subjects, and also brief references to reports published by State and other organizations. (See p. xxiii.)

GAGING STATIONS.

NOTE.—Dash following a date indicates that the station was being maintained September 30, 1915; period after date indicates discontinuance.

DRAINAGE BASINS SOUTH OF SAN FRANCISCO BAY.

Tia Juana River near Nestor, Cal., 1915.
  Cottonwood Creek near Dulzura, Cal., 1906–1915.
    Dulzura conduit near Dulzura, Cal, 1909–1915.
    Pine Valley Creek near Jamul, Cal., 1906–1908.
Sweetwater River near Descanso, Cal., 1905–
Sweetwater River near Dehesa, Cal., 1913–
San Diego River at diverting dam, near Lakeside, Cal., 1912–
San Diego River at Lakeside, Cal., 1905–
San Diego River near Santee, Cal., 1912–
San Diego River near San Diego, Cal., 1912–
  Boulder Creek at Cuyamaca reservoir, near Julian, Cal., 1912–
  Boulder Creek at mouth, near Lakeside, Cal., 1912–
  San Diego flume at diverting dam, near Lakeside, Cal., 1913–
  San Diego flume near Lakeside, Cal., 1907–
  South Fork of San Diego River near Alpine, Cal., 1913–1915.
  South Fork flume near Alpine, Cal., 1913–1915.
  San Vincente Creek at Foster, Cal., 1915.
Santa Ysabel Creek (head of San Dieguito River) near Santa Ysabel, Cal., 1913–1915.
Santa Ysabel Creek near Mesa Grande, Cal., 1912–
Santa Ysabel Creek near Ramona, Cal., 1912–
Santa Ysabel Creek near Escondido, Cal., 1905–1912.
San Dieguito River at Bernardo, Cal., 1912–
San Dieguito River near Del Mar, Cal., 1913–14.
  Black Canyon Creek near Mesa Grande, Cal., 1913–1915.
  Temescal Creek near Almond, Cal., 1913–1915.

Digitized by Google

San Dieguito River tributaries—Continued.
Guejito Creek near Escondido, Cal., 1915.
East San Pasqual ditch near Escondido, Cal., 1912–1914.
West San Pasqual ditch near Escondido, Cal., 1912–1915.
Santa Maria Creek near Ramona, Cal., 1912–
San Luis Rey River near Warner Springs, Cal., 1913–1915.
San Luis Rey River near Mesa Grande, Cal., 1911–
San Luis Rey River near Nellie, Cal., 1915–
San Luis Rey River at diversion flume, 1894–1899.
San Luis Rey River near Pala, Cal., 1903–
San Luis Rey River at Pala, Cal., 1912.
San Luis Rey River at Bonsall, Cal., 1912–
San Luis Rey River near Oceanside, Cal., 1912–1915.
Agua Caliente Creek near Warner Springs, Cal., 1913–1915.
Canada Verde Creek near Warner Springs, Cal., 1913–1915.
West Fork of San Luis Rey River near Warner Springs, Cal., 1913–1915.
Carrizo Creek near Warner Springs, Cal., 1913–1915.
Susanna Creek near Warner Springs, Cal., 1913–1915.
Matagual Creek near Warner Springs, Cal., 1912–1915.
Escondido Mutual Water Co.'s canal near Nellie, Cal., 1896–
Rincon Indian Reservation ditch near Valley Center, Cal., 1912.
Pala Indian Reservation canal at Pala, Cal., 1912–13.
San Luis Rey ditch near San Luis Rey, Cal., 1913.
Temecula Creek (head of Santa Margarita River) near Temecula, Cal., 1905–6.
Santa Ana River near Mentone, Cal., 1896–
Pacific Light & Power Corporation's canal and Greenspot pipe line near Mentone, Cal. 1896–
Highlands or North Fork canal at intake weir, San Bernardino County, Cal., 1896–1904.
Redlands or South Fork canal at sand box weir, San Bernardino County, Cal., 1896–1904.
Mill Creek in canyon, near headworks of Crafton canal, Cal., 1896–1905.
Mill Creek at Forest Home, Cal., 1903–
Waterman Canyon Creek near San Bernardino, Cal., 1911–1914.
Devil Canyon Creek near San Bernardino, Cal., 1911–1914.
Lytle Creek at mouth of canyon, near San Bernardino, Cal., 1894–1901; 1904–
Temescal Creek near Rincon, Cal., 1899.
Coldwater Creek above dam, Riverside County, Cal., 1899.
San Antonio Creek near Upland, Cal., 1901–
San Gabriel River above Fish Fork, near Azusa, Cal., 1900–1901; 1910; 1912. (Low-water records.)
San Gabriel River at headworks near Azusa, Cal., 1812–1914.
San Gabriel River near Azusa, Cal., 1894–
Pacific Light & Power Corporation's canal near Azusa, Cal., 1896–
West Branch of North Fork of San Gabriel River at weir, 1900.
North Branch of North Fork of San Gabriel River at weir, 1900.
West Fork of San Gabriel River above North Fork, Cal., 1900.
Coldwater Creek at weir above mouth, 1900.
Fish Fork of San Gabriel River near Azusa, Cal., 1900–1901; 1910; 1912. (Low-water record.)
Iron Fork of San Gabriel River near Azusa, Cal., 1900–1901; 1910; 1912. (Low-water record.)
Los Angeles River at Los Angeles, Cal., 1896–1900.
Arroyo Seco near Pasadena, Cal., 1910–

Digitized by Google

Malibu Creek near Calabasas, Cal., 1903–1906.
Triunfo Creek near Calabasas, Cal., 1903–1906.
Santa Clara River at Fillmore, Cal., 1911–12.
Piru Creek near Piru, Cal., 1911–1913.
Sespe Creek at Sespe, Cal., 1911–1913.
Santa Paula Creek near Santa Paula, Cal., 1911–1913.
Ventura River near Nordhoff, Cal., 1911–1914.
Ventura River near Ventura, Cal., 1911–1914.
San Roque Creek, Santa Barbara County, Cal., 1890.
San Jose Creek, Santa Barbara County, Cal., 1890.
Loma Abajo River, Santa Barbara County, Cal., 1890.
Gato Creek at mouth, Santa Barbara County, Cal., 1890.
Santa Ynez River near Santa Barbara, Cal., 1903–1908; 1910–
Santa Ynez River near Lompoc, Cal., 1906–
Mono Creek at Mono dam site, near Santa Barbara, Cal., 1902–1904.
Santa Maria River near Santa Maria, Cal., 1903–1906.
Salinas River near Salinas, Cal., 1900–1901.
Nacimiento Creek near Bryson, Cal., 1901.
San Antonio River near Jolon, Cal., 1900–1901.
San Lorenzo Creek near King City, Cal., 1900–1903; 1912.
Arroyo Seco near Soledad, Cal., 1901–
Pajaro River at Watsonville, Cal., 1911–1914.

SAN FRANCISCO BAY.

MINOR STREAMS.

Coyote River near Madrone, Cal., 1902–1912.
Alameda Creek at Sunolglen, Cal., 1900–
Spring Valley Water Co.'s aqueduct near Sunolglen, Cal., 1903–

KERN RIVER BASIN.

Kern River near Kernville, Cal., 1912–
Kern River at Kernville, Cal., 1905–1912.
Kern River at Isabella, Cal., 1910–1912.
Kern River at Rio Bravo ranch, Cal., 1878–1884.
Kern River near Bakersfield, Cal., 1894–
Kern River Power Co.'s canal at Kernville, Cal., 1910–1914.
South Fork of Kern River near Onyx, Cal., 1911–1914.
South Fork of Kern River at Isabella, Cal., 1910–1913.
Erskine Creek near Bodfish, Cal., 1911–
Caliente Creek at base of foothills, Kern County, Cal., 1878–1884.
Basin Creek near Havilah, Cal., 1911–1913.
Tejon House Creek at Tejon ranch house, Cal., 1895–96.
San Emigdio Creek at San Emigdio ranch house, Cal., 1894–95.

TULARE LAKE BASIN.

Tulare Lake in Kings County, Cal., 1906–
Poso Creek at base of foothills, Kern County, Cal., 1878–1884.
White River at base of foothills, Tulare County, Cal., 1878–1884.
White River near Hot Springs, Cal., 1911–1913.
Deer Creek at base of foothills, Tulare County, Cal., 1878–1884.
Deer Creek at Hot Springs, Cal., 1910–
Tyler Creek near Hot Springs, Cal., 1911–1913.
Tule River, North Fork of Middle Fork, near Springville, Cal., 1909–1913.
Tule River near Portersville, Cal., 1901–

Digitized by Google

Tule River at Portersville, Cal., 1878–1884.
South Fork of Middle Fork of Tule River near Springville, Cal., 1909–1913.
Bear Creek near Springville, Cal., 1911–
South Fork of Tule River near Portersville, Cal., 1910–
Kaweah River, Middle Fork, near Hammond, Cal., 1913.
Kaweah River at Wachumna Hill, Cal., 1878–1884.
Kaweah River near Three Rivers, Cal., 1911–
Marble Fork of Kaweah River near Ranger, Cal., 1913.
East Fork of Kaweah River near Hammond, Cal., 1913.
North Fork of Kaweah River near Kaweah, Cal., 1913.
North Fork of Kaweah River at Kaweah, Cal., 1910–
South Fork of Kaweah River near Three Rivers, Cal., 1911–
Kings River at Suspension Bridge, Cal., 1895.
Kings River near Sanger, Cal., 1895–
Kings River at Slate Point, Cal., 1878–1884.
Kings River at Kingsburg, Cal., 1891–1904.
Dinkey Creek near Ockenden, Cal., 1910–1915.
Big Creek near Tollhouse, Cal., 1911–1914.
Rush Creek near Ockenden, Cal., 1910–1913.

SAN JOAQUIN RIVER BASIN.

San Joaquin River near Shaver, Cal., 1912–1915.
San Joaquin River near North Fork, Cal., 1910–1914.
San Joaquin River near Friant, Cal., 1907–
San Joaquin River near Hamptonville, Cal., 1878–1884.
San Joaquin River at Herndon, Cal., 1891–1909.
San Joaquin River near Newman, Cal., 1912–
Big Creek near Big Creek, Cal., 1910–1915.
Pitman Creek at Big Creek, Cal., 1910–1915.
North Fork Creek near North Fork, Cal., 1910–11.
Crane Valley reservoir near North Fork, Cal., 1910–1915.
Evaporation from Crane Valley reservoir near North Fork, Cal., 1910–1915.
South Fork Creek near North Fork, Cal., 1910–1915.
South Fork ditch near North Fork, Cal., 1910; 1913.
Whiskey Creek near North Fork, Cal., 1910–1915.
Cascadel Creek near North Fork, Cal., 1910–1912.
Fresno River at base of foothills, Madera County, Cal., 1878–1884.
Fresno River near Knowles, Cal., 1911–1914.
Nelder Creek near Fresno Flats, 1910–1912.
North Fork of Fresno River near Sugar Pine, Cal., 1910–1912.
Chowchilla Creek at base of foothills, near Buchanan, Cal., 1878–1884.
Mariposa Creek at base of foothills, Mariposa County, Cal., 1878–1884.
Bear Creek at base of foothills, Merced County, Cal., 1878–1884.
Merced River above Illilouette Creek, near Yosemite, Cal., 1915.
Merced River at Happy Isles Bridge, near Yosemite, Cal., 1915–
Merced River at Yosemite, Cal., 1904–1909; 1912–
Merced River near Merced Falls, Cal., 1901–1913.
Merced River at Merced Falls, Cal., 1878–1884.
Merced River near Newman, Cal., 1912.
Illilouette Creek near Yosemite, Cal., 1915.
Tenaya Creek near Yosemite, Cal., 1904–1909; 1912–
Yosemite Creek at Yosemite, Cal., 1904–1909; 1912–
South Fork of Merced River near Wawona, Cal., 1910–
Big Creek near Wawona, Cal., 1910–11.

Digitized by Google

San Joaquin River—Continued.
Tuolumne River at Hetch Hetchy cabin, near Sequoia, Cal., 1910–
Tuolumne River at Hetch Hetchy dam site, near Sequoia, Cal., 1901; 1910–1915.
Tuolumne River below Hetch Hetchy dam site, near Sequoia, Cal., 1915–
Tuolumne River near Groveland, Cal., 1907–
Tuolumne River above La Grange dam, near La Grange, Cal., 1915–
Tuolumne River near La Grange, Cal., 1895–
Tuolumne River at Modesto, Cal., 1878–1884; 1891–1897.
Cherry Creek near Sequoia, Cal., 1901; 1910–
Eleanor Creek near Sequoia, Cal., 1901; 1909–
Evaporation from Lake Eleanor near Sequoia, Cal., 1915–
Jawbone Creek near Tuolumne, Cal., 1910–1915.
Corral Creek near Groveland, Cal., 1910–1913.
South Fork of Tuolumne River near Sequoia, Cal., 1914–
South Fork of Tuolumne River near Groveland, Cal., 1910–
Golden Rock ditch near Sequoia, Cal., 1914–
Clavey River near Tuolumne, Cal., 1910–1913.
Indian Creek near Tuolumne, Cal., 1910–11.
North Fork of Tuolumne River near Tuolumne, Cal., 1910–11.
Hunter Creek near Tuolumne, Cal., 1910–1913.
La Grange [Yosemite] Water & Power Co.'s canal near La Grange, Cal., 1908–
Modesto canal near La Grange, Cal., 1903–
Turlock canal near La Grange, Cal., 1899–
Stanislaus River, Middle Fork, at Sand Bar Flat, near Avery, Cal., 1905–
Stanislaus River at Knights Ferry, Cal., 1903–
Stanislaus River at Oakdale, Cal., 1878–1884; 1895–1900.
Relief reservoir near Baker Station, Cal., 1910–
Relief Creek near Baker Station, Cal., 1910–
North Fork of Stanislaus River near Avery, Cal., 1914–
Utica Gold Mining Co.'s canal near Avery, Cal., 1914–
Rose Creek near Jupiter, Cal., 1910–1913.
Knight Creek near Jupiter, Cal., 1910–1913.
South Fork of Stanislaus River at Strawberry, Cal., 1911–
South Fork of Stanislaus River near Columbia, Cal., 1910–1913.
South San Joaquin canal near Knights Ferry, Cal., 1914–
Oakdale canal near Knights Ferry, Cal., 1914–
Stanislaus & San Joaquin Water Co.'s canal at Knights Ferry, Cal., 1904–1913.
Calaveras River at Jenny Lind, Cal., 1907–
Calaveras River near Bellota, Cal., 1878–1884.
Mokelumne River at Electra, Cal., 1901; 1903-4.
Mokelumne River at Lone Star Mill, Cal., 1878–1884.
Mokelumne River near Clements, Cal., 1904–
Mokelumne River at Lodi, Cal., 1891–1895.
Middle Fork of Mokelumne River at West Point, Cal., 1911–
South Fork of Mokelumne River near Railroad Flat, Cal., 1911–
Licking Fork of Mokelumne River near Railroad Flat, Cal., 1911–
Dry Creek near Ione, Cal., 1911–12.
Dry Creek at base of foothills, San Joaquin County, Cal., 1878–1884.
Cosumnes River, North Fork, near Pleasant Valley, Cal., 1906–7.
Cosumnes River, North Fork, near Eldorado, Cal., 1911–
Cosumnes River at Michigan Bar, Cal., 1907–
Cosumnes River below Michigan Bar, Cal., 1878–1884.
Sly Park Creek at Park, Cal., 1906.

Digitized by Google

GOOSE LAKE BASIN.

Drews Creek reservoir near Lakeview, Oreg., 1913–
Drews Creek near Lakeview, Oreg., 1909–
Dog Creek near Lakeview, Oreg., 1912–13.
North Drews canal near Lakeview, Oreg., 1914–
Cottonwood Creek near Lakeview, Oreg., 1908–
Thomas Creek near Lakeview, Oreg., 1912–

SACRAMENTO RIVER BASIN.

Sacramento River at Castella, Cal. 1910–
Sacramento River at Antler, Cal., 1910–11.
Sacramento River at Jellys Ferry, Cal., 1895–1902.
Sacramento River near Red Bluff, Cal., 1902–
Sacramento River at Red Bluff, Cal., 1894–1896.
Sacramento River at Collinsville, Cal., 1878–1885.
Pit River near Canby, Cal., 1904–5.
Pit River near Bieber, Cal., 1904–1908; 1913–14.
Pit River at Henderson, Cal., 1910–
Pit River near Ydalpom, Cal., 1910–
South Fork of Pit River near Ivy, Cal., 1904–5.
West Valley Creek near Likely, Cal., 1904–5.
Ash Creek at Adin, Cal., 1904–5.
Fall River at Fall River Mills, Cal., 1912–13.
Hat Creek at Hawkin's ranch, near Hat Creek, Cal., 1911–1913.
Hat Creek at Hat Creek, Cal., 1910–
Rising River near Cassel, Cal., 1911–1914.
Burney Creek near Burney, Cal., 1911–1913.
Kosk Creek near Henderson, Cal., 1910–
Montgomery Creek at Montgomery Creek, Cal., 1911–1913.
Squaw Creek near Ydalpom, Cal., 1911–1913.
McCloud River near Gregory, Cal., 1902–1908.
McCloud River at Baird, Cal., 1910–
Clear Creek near Shasta, Cal., 1911–1913.
Cow Creek at Millville, Cal., 1911–1914.
Clover Creek at Millville, Cal., 1911–1914.
Little Cow Creek at Palo Cedro, Cal., 1911–1914.
Bear Creek near Millville, Cal., 1911–1914.
North Fork of Cottonwood Creek at Ono, Cal., 1907–1914.
Mill Creek near Los Molinos, Cal., 1909–1913.
Deer Creek near Vina, Cal., 1911–1915.
Stony Creek near Stonyford, Cal., 1913–1914.
Stony Creek near Fruto, Cal., 1901–1912.
Little Stony Creek near Lodoga, Cal., 1907–
Feather River, North Fork, above Prattville, Cal., 1905–1907.
Feather River, North Fork, near Prattville, Cal., 1905–
Feather River, North Fork, at Big Bar, Cal., 1911–
Feather River, North Fork, at Big Bend, Cal., 1905–1910.
Feather River at Oroville, Cal., 1902–
Hamilton Branch near Prattville, Cal., 1905–1907.
Butt Creek at Butte Valley, Cal., 1905–
Indian Creek near Crescent Mills, Cal., 1906–1909; 1911–
Spanish Creek at Keddie, Cal., 1911–

Digitized by Google

Sacramento River tributaries—Continued.
Feather River tributaries—Continued.
Middle Fork of Feather River near Cromberg, Cal., 1910–
Middle Fork of Feather River near Oroville, Cal., 1911–
Grizzly Creek near Beckwith, Cal., 1905–6.
South Fork of Feather River at Enterprise, Cal., 1911–
Palermo Land & Water Co.'s canal at Enterprise, Cal., 1911–
Yuba River, Middle Fork, near North San Juan, Cal., 1900; 1910–
Yuba River at Smartsville, Cal., 1903–
Yuba River at Parks Bar bridge, near Smartsville, Cal., 1900.
Oregon Creek near North San Juan, Cal., 1910–
North Fork of Yuba River near Sierra City, Cal., 1911–1913.
North Fork of Yuba River at Goodyear Bar, Cal., 1910–
North Fork of Yuba River near North San Juan, Cal., 1900.
North Fork of North Fork of Yuba River at Downieville, Cal., 1910–
Rock Creek at Goodyear Bar, Cal., 1910–
Goodyear Creek at Goodyear Bar, Cal., 1910–
Bear River near Colfax, Cal., 1911–
Bear River at Van Trent, Cal., 1904–
Bear River canal near Colfax, Cal., 1911–
American River, North Fork, near Colfax, Cal., 1911–
American River at Fairoaks, Cal., 1904–
Middle Fork of American River near East Auburn, Cal., 1911–
Rubicon River at Rubicon Springs, Cal., 1910–1914.
Rubicon River near Quintette, Cal., 1909–1914.
Little Rubicon River near Rubicon Springs, Cal., 1910–11.
Little South Fork of Rubicon River at sawmill near Quintette, Cal., 1910–1914.
Little South Fork of Rubicon River below Gerle Creek near Quintette, Cal., 1910–1914.
Little South Fork of Rubicon River at mouth, near Quintette, Cal., 1909–1911.
Gerle Creek near Rubicon Springs, Cal., 1910–1914.
Little South Fork ditch at sawmill near Quintette, Cal., 1910,–1913.
Pilot Creek near Quintette, Cal., 1910–1914.
Pilot Creek ditch near Quintette, Cal., 1910–1914.
South Fork of American River at Kyburz, Cal., 1906–7.
South Fork of American River near Kyburz, Cal., 1906.
South Fork of American River below Kyburz, Cal., 1907.
South Fork of American River near Placerville, Cal., 1911–
Clear Lake at Lakeport, Cal., 1874–1900; 1913–
Cache Creek at Lower Lake, Cal., 1901–1915.
Cache Creek at Yolo, Cal., 1903–
Putah Creek near Guenoc, Cal., 1904–1906.
Putah Creek at Winters, Cal., 1905–

DRAINAGE BASINS NORTH OF SAN FRANCISCO BAY.

RUSSIAN RIVER BASIN.

Russian River near Ukiah, Cal., 1911–1913.
Russian River at Geyserville, Cal., 1910–1913.
East Fork of Russian River near Ukiah, Cal., 1911–1913.

MATTOLE RIVER BASIN.

Mattole River near Petrolia, Cal., 1911–1913.

Digitized by Google

EEL RIVER BASIN.

South Eel River at Hearst, Cal., 1910–1913.
Eel River at Two Rivers, Cal., 1911–1913.
Eel River at Scotia, Cal., 1910–1915.
Middle Eel River near Covelo, Cal., 1911–
South Fork of Eel River at Garberville, Cal., 1911–1913.
Van Duzen River at Bridgeville, Cal., 1911–1913.
Yager Creek at Carlotta, Cal., 1911–1914.

MAD RIVER BASIN.

Mad River near Arcata, Cal., 1910–1913.

REDWOOD CREEK BASIN.

Redwood Creek near Korbel, Cal., 1911–1913.
Redwood Creek at Orick, Cal., 1911–1913.

KLAMATH RIVER BASIN.

Williamson River (head of Klamath River) above Spring Creek, near Chiloquin, Oreg., 1908–1910; 1912–13.
Williamson River at Chiloquin, Oreg., 1911–
Upper Klamath Lake near Klamath Falls, Oreg., 1904; 1906–
Link River at Klamath Falls, Oreg., 1904–
Klamath River below Klámath Falls, Oreg., 1907–1909.
Klamath River at Keno, Oreg., 1904–1913.
Klamath River at Spencer Bridge, near Keno, Oreg., 1914–
Klamath River near Seiad Valley, Cal., 1912–
Klamath River near Happy Camp, Cal., 1911–12.
Klamath River near Requa, Cal., 1910–
Miller Creek near Crescent, Oreg., 1911–1914.
Sprague River near (above) Yainax, Oreg., 1912–
Sprague River near (below) Yainax, Oreg., 1904.
Sprague River at Chiloquin, Oreg., 1911–
Sycan River near Silverlake, Oreg., 1905–6.
Sycan River near Yainax, Oreg., 1911–
Modoc Point canal at Chiloquin, Oreg., 1915–
Wood River at Fort Klamath, Oreg., 1911–
Anna Creek at Crater Lake post office, Oreg., 1913.
Fourmile Creek near Odessa, Oreg., 1912–
"A" canal at Klamath Falls, Oreg., 1911–
Lost River near Clear Lake, Cal., 1904–1909.
Lost River above Olene, Oreg., 1915–
Lost River at Olene, Oreg., 1904; 1907–1912.
Lost River at Wilson Bridge near Olene, Oreg., 1912–
Lost River near Merrill, Oreg., 1904–1909.
Lost River diversion canal near Olene, Oreg., 1912–
Tule Lake near Merrill, Oreg., 1904–
Miller Creek near Lorella, Oreg., 1909–
Olene wasteway at Olene, Oreg., 1915–
"G" canal [1] at Lost River dam near Olene, Oreg., 1913–

[1] Formerly called Griffith lateral

Digitized by Google

Klamath River tributaries—Continued.
Lower Klamath Lake near Brownell, Cal., 1907–1909; 1912–
Shasta River near Montague, Cal., 1911–1913.
Scott River, East Fork, near Callahan, Cal., 1910–1913.
Scott River, East Fork, at Callahan, Cal., 1913–
Scott River at Callahan, Cal., 1911–
Scott River near Scott Bar, Cal., 1911–1913.
Indian Creek near Happy Camp, Cal., 1911–
Reeve Davis flume near Happy Camp, Cal., 1911–1913.
Salmon River at Somesbar, Cal., 1911–1915.
Trinity River near Trinity Center, Cal., 1910–1913.
Trinity River at Lewiston, Cal., 1911–1914.
Trinity River near China Flat, Cal., 1911–1913.
Trinity River at Hoopa, Cal., 1911–1914.
Coffee Creek at Coffee, Cal., 1910–1914.
East Fork of Trinity River near Trinity Center, Cal., 1910–1914.
Swift Creek near Trinity Center, Cal., 1910–1914.
North Fork of Trinity River at Helena, Cal., 1911–1914.
South Fork of Trinity River near China Flat, Cal., 1911–1913.
Smith River, Middle Fork, near Crescent City, Cal., 1911–
North Fork of Smith River near Crescent City, Cal., 1911–
South Fork of Smith River near Crescent City, Cal., 1911–1913.

Digitized by Google

REPORTS ON WATER RESOURCES OF PACIFIC SLOPE BASINS OF CALIFORNIA.

PUBLICATIONS OF UNITED STATES GEOLOGICAL SURVEY.

WATER-SUPPLY PAPERS.

Water-supply papers are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers marked in this way may, however, be purchased (at price noted) from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Omission of the price indicates that the report is not obtainable from Government sources. Water-supply papers are of octavo size.

*17. Irrigation near Bakersfield, Cal., by C. E. Grunsky. 1898. 96 pp., 16 pls.

*18. Irrigation near Fresno, Cal., by C. E. Grunsky. 1898. 94 pp., 14 pls.

*19. Irrigation near Merced, Cal., by C. E. Grunsky. 1899. 59 pp., 11 pls.

Water-Supply Papers 17, 18, and 19 discuss the development of irrigation in the San Joaquin Valley, outline physiographic features, and give history of the various irrigation districts. Chiefly of historic interest as indicated by dates of publication.

*43. Conveyance of water in irrigation canals, flumes, and pipes, by Samuel Fortier. 1901. 86 pp., 15 pls. 15c.

Describes the location and construction of various types of canals for irrigation.

*44. Profiles of rivers in the United States, by Henry Gannett. 1901. 100 pp., 11 pls. 15c.

Gives elevations and distances along Sacramento, Pit, Feather, Yuba, American, Cosumnes, Mokelumne, Calaveras, Tuolumne, and Klamath rivers, Cal.

*45. Water storage on Cache Creek, Cal., by A. E. Chandler. 1901. 48 pp., 10 pls. 15c.

Discusses topography, precipitation, stream measurements, ground waters, and irrigation works in Cache Creek basin; includes description of Clear Lake.

46. Physical characteristics of Kern River, Cal., by F. H. Olmsted, and Reconnaissance of Yuba River, Cal., by Marsden Manson. 1901. 57 pp., 8 pls. 10c.

Describes topography of Kern River basin, gives estimates of daily and monthly discharge, and discusses possible utilization of storage sites and development of power. The second paper in the report gives similar data for Yuba River.

*57. Preliminary list of deep borings in the United States, Part I (Alabama-Montana), by N. H. Darton. 1902. 60 pp. (See No. 149.) 5c.

Contains information as to depth, diameter, yield, and head of water in borings more than 400 feet deep; under head "Remarks" gives information concerning temperature, quality of water, purposes of boring, etc.

*58. Storage of water on Kings River, Cal., by J. B. Lippincott. 1902. 101 pp., 32 pls. 15c.

Discusses physical features, rainfall, stream flow, evaporation and seepage, and power development; includes chapter (by Lewis A. Hicks) on the generation and transmission of electric power and installation of pumping plants.

*59. Development and application of water near San Bernardino, Colton, and Riverside, Cal., Part I, by J. B. Lippincott. 1902. 95 pp., 11 pls.

Digitized by Google

*60. Development and application of water near San Bernardino, Colton, and Riverside, Cal., Part II, by J. B. Lippincott. 1902. 45 pp. (97–141), 15c.

Nos. 59 and 60 describe topography, soil, climate, crops, canals, wells, and pumping plants; discuss briefly the manufacture of Portland cement in southern California.

*81. California hydrography, by J. B. Lippincott. 1903. 488 pp., 1 pl. 25c.

A collection of published records of stream flow "hitherto much scattered, some of them out of print and difficult to secure," brought together as a book of reference for engineers a irrigators.

86. Storage reservoirs on Stony Creek, Cal., by Burt Cole. 1903. 62 pp., 16 pls. 15c.

Discusses briefly water supply of Glenn County as related to population and industry, irrigation districts, the proposed Stony Creek forest reserve, and storage sites on Grindstone, Salt, Briscoe, and Stony creeks.

89. Water resources of the Salinas Valley, Cal., by Homer Hamlin. 1904. 91 pp., 12 pls. 15c.

Describes briefly the geography, topography, general and economic geology, climate, water supply, and irrigation of the Salinas Valley.

*103. A review of the laws forbidding pollution of inland waters in the United States, by E. B. Goodell. 1904. 120 pp. Superseded by 152.

Cites statutory restriction of water pollution in California.

*112. Underflow tests in the drainage basin of Los Angeles River, by Homer Hamlin. 1905. 55 pp., 7 pls. 5c.

Discusses conditions under which ground water occurs in arid regions, and fluctuations in water level; describes machinery and methods used in sinking test wells and the results obtained at each station.

116. Water problems of Santa Barbara, Cal., by J. B. Lippincott. 1905. 99 pp., 8 pls. 10c.

Reviews earlier work in Santa Barbara region and describes near-by and distant water supplies, including Ventura and Santa Ynez rivers; discusses the quality of the water of the Santa Ynez (giving analyses) and the available reservoir sites.

122. Relation of the law to underground waters, by D. W. Johnson. 1905. 55 pp. 5c.

Cites legislative acts relating to ground waters in California.

*137. Development of underground waters in the eastern coastal-plain region of southern California, by W. C. Mendenhall. 1905. 140 pp., 7 pls. 35c.

*138. Development of underground waters in the central coastal-plain region of southern California, by W. C. Mendenhall. 1905. 162 pp., 5 pls. 25c.

*139. Development of underground waters in the western coastal-plain region of southern California, by W. C. Mendenhall. 1905. 105 pp., 8 pls. 25c.

Three reports discussing the topography, crops, irrigation systems, and wells, and the effects of development and drought on changes in ground-water level. The area covered by these reports includes the Anaheim, Santa Ana, Downey, Las Bolsas, Santa Monica, and Redondo quadrangles in Orange and Los Angeles counties.

140. Field measurements of the rate of movement of underground waters, by C. S. Slichter. 1905. 122 pp., 15 pls. 15c.

Contains chapters on measurements of underflow of Rio Hondo, San Gabriel, and Mohave rivers.

*142. The hydrology of San Bernardino Valley, Cal., by W. C. Mendenhall. 1905. 124 pp., 12 pls. 25c.

Discusses rainfall, soils, artesian areas, temperature, and chemical character of the ground waters, gives tables of flow of Santa Ana River, Mill Creek, and other streams, and lists of wells in Redlands and San Bernardino quadrangles.

Digitized by Google

146. Proceedings of second conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer. 1905. 267 pp. 15c. [Inquiries concerning this report should be addressed to the Reclamation Service.] Contains:

A report on "Underground waters of southern California," by W. C. Mendenhall. Gives an account of early irrigation by use of surface waters, the development of artesian wells for irrigation, and discusses the origin, distribution, and character of the artesian waters, the causes of fluctuations in the supply, and the need of moderation in use.

A report on the Klamath project, by J. B. Lippincott. Describes Klamath River and its principal tributaries and Lost River and Tule Lake. Describes also the irrigable lands in Butte Valley and around Tule and Lower Klamath lakes and in the Klamath Indian Reservation.

A brief report on "Pumping underground water in southern California," by F. C. Finkle. Discusses underground reservoirs, the source, extent, and methods of replenishment of the water supply, and describes the efficiency of pumps and the development of electric power for pumping.

147. Destructive floods in the United States in 1904, by E. C. Murphy and others. 1905. 206 pp., 18 pls. 15c. Contains:

Sacramento River flood, California, from report of S. G. Bennett. Gives accounts of flood on Sacramento River; describes briefly the streams of the basin, precipitation, discharge, damages, and prevention of future losses.

149. Preliminary list of deep borings in the United States, second edition, with additions, by N. H. Darton. 1905. 175 pp. 10c.

Gives, by States (and within the States by counties), location, depth, diameter, yield, height of water, and other information concerning wells 400 feet or more in depth; includes all wells listed in Water-Supply Papers 57 and 61; mentions also principal publications relating to deep borings.

152. A review of the laws forbidding pollution of inland waters in the United States (second edition), by E. B. Goodell. 1905. 149 pp. 10c.

Cites statutory restrictions of water pollution in California.

*162. Destructive floods in the United States in 1905, with a discussion of flood discharge and frequency and an index to flood literature by E. C. Murphy and others. 1906. 105 pp., 4 pls. 15c.

Gives estimates of flood flow and frequency (p. 85) for Tuolumne River at La Grange, Kern River at Rio Bravo ranch, and Kings River at Sanger.

*213. The surface water supply of California, 1906, by W. B. Clapp, with a section on ground-water levels in southern California, by W. C. Mendenhall. 1907. 219 pp., 4 pls. 25c.

Contains the results of a series of measurements of the fluctuation of ground-water levels made during 1904, 1905, and 1906. The wells were "so selected that they would be evenly distributed over the various basins which together make up the lowland areas of southern California, and would thus give an adequate basis for conclusions as to conditions in each of these basins."

*219. Ground waters and irrigation enterprises in the foothill belt, southern California, by W. C. Mendenhall. 1908. 180 pp., 9 pls. 50c.

Describes the general geologic conditions, physical features, rainfall, storage facilities, character and condition of subterranean reservoirs, measures for conservation of waters, and the ground waters by districts; discusses fluctuation in ground-water levels and gives results of measurements; describes irrigation enterprises and systems and gives statistics of wells.

*220. Geology and water resources of a portion of south-central Oregon, by G. A. Waring. 1908. 86 pp., 10 pls. 20c.

Describes the rocks, streams, lakes, and lake valleys, deep and shallow wells, climate, soils, vegetation, industries, and reclamation projects in Lake County; gives analyses of soils and waters. The greater part of the area described is considered part of the Great Basin, but the streams of a small area in the southern part are tributary to Goose Lake, which within historic times has overflowed southward to Pit River, a tributary of the Sacramento.

Digitized by Google

*222. Preliminary report on the ground waters of San Joaquin Valley, Cal., by W. C. Mendenhall. 1908. 52 pp., 1 pl. 10c.

Describes the geography of the valley, the rocks, soils, surface waters, and the origin, circulation, quantity, accessibility, and development of the ground waters; gives notes on water supply by counties.

237. The quality of the surface waters of California, by Walton Van Winkle and F. M. Eaton. 1910. 142 pp., 1 pl. 20c.

Describes geography, climate, industrial development, and drainage, and gives results of mineral analyses of the river waters.

251. Surface water supply of the United States, 1907–8, Part XI. California, by W. B. Clapp and W. F. Martin. 1910. 363 pp., 7 pls. 35c.

Contains a section (pp. 338-348) on "fluctuations in ground-water levels in the valley of southern California." The measurements here published form a continuation of those published in Water-Supply Paper 213. They were made at irregular intervals during 1907-8 on the same wells that were measured during the earlier period, except for a few wells that had become inaccessible.

274. Some stream waters of the western United States, with chapters on sediment carried by the Rio Grande and the industrial application of water analyses, by Herman Stabler. 1911. 188 pp. 15c.

Describes collection of samples, plan of analytical work, and methods of analyses; discusses soap-consuming power of waters, water softening, boiler waters, and water for irrigation; gives results of analyses of waters of Sacramento, Pit, Feather, Yuba, and American rivers, Stony and Putah creeks, and Tuolumne River; also of Link River, Oreg., in Klamath River basin.

295. Gazetteer of surface waters of California, Part I, Sacramento River basin, by B. D. Wood. 1912. 99 pp. 10c.

296. Gazetteer of surface waters of California, Part II, San Joaquin River basin, by B. D. Wood. 1912. 102 pp. 10c.

297. Gazetteer of surface waters of California, Part III, Pacific coast and Great Basin streams, by B. D. Wood. 1913. 244 pp. 20c.

Nos. 295–297 embrace descriptions of streams and lakes named on best available maps of California.

298. Water resources of California, Part I, Stream measurements in Sacramento River basin, by H. D. McGlashan and F. F. Henshaw. 1912. 411 pp., 8 pls. 30c.

299. Water resources of California, Part II, Stream measurements in San Joaquin River basin, by H. D. McGlashan and H. J. Dean. 1912. 439 pp., 7 pls. 35c.

*300. Water resources of California, Part III, Stream measurements in the Great Basin and Pacific coast river basins, by H. D. McGlashan and H. J. Dean. 1913. 956 pp., 4 pls. 55c.

Nos. 298-300 comprise all data concerning stream flow in California available up to September 30, 1912. The reports describe the drainage basins, precipitation, temperature, and forests, and give the results of work at gaging stations. See also Nos. 295–297.

338. Springs of California, by Gerald A. Waring. 1915. 410 pp., 13 pls. 60c.

Describes briefly the physical features of California, including the coast ranges, Great Central Valley, the lava-covered region, the Sierra Nevada, the southeastern desert, and faults; defines "mineral water" and "pure water"; discusses source and amount of substances in waters, degree of concentration of natural waters and their properties, and the therapeutic value, temperature, and classification of mineral waters. The springs are described under the headings "hot," "carbonated," "sulphur," "saline," "magnesic," "iron," "artesian," "large cold," and "minor perennial" springs.

Digitized by Google

*345. Contributions to the hydrology of the United States, 1914; N. C. Grover, chief hydraulic engineer. 1915. 225 pp., 17 pls. 30c. Contains:

(*h*) Ground-water resources of the Niles cone and adjacent areas, California, by W. O. Clark. Describes an area just east of the south end of San Francisco Bay. The investigation on which the report is based was made "to determine the source of the ground water, the quantity now being withdrawn, the amount available, and the area dependent on Alameda Creek." Describes the physiography and drainage of mountain and valley areas; gives records of precipitation in Alameda and Santa Clara counties and of the monthly discharge of Alameda Creek; discusses the source of the ground waters, the effect of the Niles-Irvington fault, contributions to the ground-water supply, relation of withdrawals to contributions, and gives a summary of conclusions.

363. Quality of the surface waters of Oregon, by W. Van Winkle. 1914. 137 pp., 2 pls. 20c.

Among the drainage basins described is Goose Lake, which has within historic times discharged southward to Pit River, a tributary of the Sacramento, and Klamath River, which enters the Pacific in northern California.

364. Water analyses from the laboratory of the United States Geological Survey, tabulated by F. W. Clarke, chief chemist. 1914. 40 pp. 5c.

Contains analyses of water from Matilija Hot Springs, Cal., and of mine waters from Nevada City and Sulphur Bank [near Clear Lake], Cal.

*375. Contributions to the hydrology of the United States, 1915; Nathan C. Grover, chief hydraulic engineer. 1916. 181 pp., 9 pls. 15c. Contains:

(*a*) Ground water for irrigation in the Sacramento Valley, Cal., by Kirk Bryan. Describes the geography and the geology of the valley and the origin and the movements of the ground water, and discusses problems relating to wells and to pumping; gives a brief account of the progress of irrigation with well water.

398. Ground water in San Joaquin Valley, Cal., by W. C. Mendenhall, R. B. Dole, and Herman Stabler. 1916. 310 pp., 5 pls. 25c.

Describes the geography of the valley and gives the geologic outline of the rocks of the border and the origin of the present surface; describes the occurrence and utilization of ground water, the chemical composition of surface and ground waters, and gives notes by counties. Contains 62 tables, most of which relate to the qualities of the waters.

*400. Contributions to the hydrology of the United States, 1916; Nathan C. Grover, chief hydraulic engineer. 108 pp., 7 pls. Contains:

(*e*) Ground water for irrigation in the Morgan Hill area, Cal., by W. O. Clark.

426. Southern California floods of January, 1916, by H. D. McGlashan and F. C. Ebert. 1918. 81 pp., 17 pls. 15c.

Compares the flood of January, 1916, with previous floods, summarizes the damages, and gives flood-flow records.

ANNUAL REPORTS.

Each of the papers contained in the annual reports was also issued in separate form.

Annual reports are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers so marked, however, may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C.

*Tenth Annual Report of the United States Geological Survey, 1888–89, J. W. Powell, Director. 1890. 2 parts. *Pt. II, Irrigation, viii, 123 pp. 35c.

Makes a preliminary report on the organization and prosecution of the survey of the arid lands for purposes of irrigation; includes an account of the methods of topographic and hydraulic work, the segregation work on reservoir sites and irrigable lands, field and office methods, and brief descriptions of the topography of some of the river basins.

Digitized by Google

Eleventh Annual Report of the United States Geological Survey, 1889–90, J. W. Powell, Director. 1891. 2 parts. Pt. II, Irrigation, xiv, 395 pp., 30 pls. (67–96) and maps. $1.25. Contains:

*Hydrography, pp. 1–110. Discusses scope of work, methods of stream measurement, rainfall, and evaporation, and describes the more important streams.

*Engineering, pp. 111–200. Defines the scope of the work and gives an account of the surveys in the Sun River basin and in the Arkansas, Rio Grande, California, Lahontan, Utah, and Snake River divisions.

*The arid lands, pp. 201–289. Includes statement of the Director to the House Committee on Irrigation and extracts from the constitutions of States relating to irrigation.

*Topography, pp. 291–343. Comprises reports of the topographic surveys in California, Nevada, Colorado, Idaho, Montana, and New Mexico, and a report on reservoir sites.

Twelfth Annual Report of the United States Geological Survey, 1890–91, J. W. Powell, Director. 1891. 2 parts. Pt. II, Irrigation, xviii, 576 pp., 93 pls. (54–146) $2. Contains:

*Report upon the location and survey of reservoir sites during the fiscal year ended June 30, 1891, by A. H. Thompson, pp. 1–212, pls. 54–57. Describes reservoir sites in California; for each reservoir site gives the location, height of dam, area inclosed by top contour, approximate contents of reservoir, position of irrigable lands, and areas of segregated lands.

*Hydrography of the arid regions, by F. H. Newell, pp. 213–361, pls. 58–106. Discusses the available water supply of the arid regions, the duty of water, flood waters, relation of rainfall to river flow; classifies the drainage basins; and describes the rivers of the Missouri, Arkansas, Rio Grande, Colorado, Sacramento, and San Joaquin basins, and the principal streams of the Great Basin in Nevada and Utah and the Snake River drainage.

Thirteenth Annual Report of the United States Geological Survey, 1891–92, J. W. Powell, Director. 1892. (Pts. II and III, 1893.) 3 parts. *Pt. III, Irrigation, xi, 486 pp., 77 pls. (108–184). $1.85. Contains:

*Engineering results of irrigation survey, by H. M. Wilson, pp. 351–427, pls. 147–182. Describes results of surveys of High Sierra reservoirs—Bear Valley, Kennedys Meadow, Kennedys Lake, Lake Eleanor, Tuolumne Meadows, Lake Tenaya, and Little Yosemite—and of Clear Lake, Cal.

Sixteenth Annual Report of the United States Geological Survey, 1894–95, Charles D. Walcott, Director. 1896. (Pts. II, III, and IV, 1895.) 4 parts. *Pt. II. Papers of an economic character, xix, 598 pp., 42 pls. $1.25. Contains:

The public lands and their water supply, by F. H. Newell, pp. 457–533, pls. 35–39. Describes general character of the public lands, the lands disposed of (railroad, grant and swamp lands, and private and miscellaneous entries), lands reserved (Indian, forest, and military reservations), the vacant lands, and the rate of disposal of vacant lands; discusses the streams, wells, and reservoirs as sources of water supply; gives details for each State.

Eighteenth Annual Report, United States Geological Survey, 1896–97, Charles D. Walcott, Director. 1897. 5 parts in 6 volumes. *Pt. IV, Hydrography, x, 756 pp., 102 pls. $1.75. Contains:

*Reservoirs for irrigation, by J. D. Schuyler, pp. 617–740, pls. 48–102. Describes rock-fill, masonry, and earthen dams, and hydraulic dam construction in California, and projected reservoirs; gives tables of reservoir capacities and areas.

Twentieth Annual Report of the United States Geological Survey, 1898–99, Charles D. Walcott, Director. 1899. (Parts II, III, IV, V, and VII, 1900.) 7 parts in 8 vols. and separate case for maps with Pt. V. *Pt. V, Forest Reserves, xix, 498 pp., 159 pls., 8 maps in separate case. $2.80. Contains:

*The San Gabriel Forest Reserve, by J. B. Leiberg, pp. 411–428, pls. 143–146. The San Bernardino Forest Reserve, by J. B. Leiberg, pp. 429–454, pls. 147–153. The San Jacinto Forest Reserve, by J. B. Leiberg, pp. 455–478, pls. 154–159. Describes general topographic features of forest reserves and drainage, part of which is by streams tributary to the Pacific and part by streams that are lost in the sands of the Mohave and other deserts.

Digitized by Google

PROFESSIONAL PAPERS.

Professional papers are distributed free by the Geological Survey as long as the stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers marked with an asterisk may, however, be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Professional papers are of quarto size.

105. Hydraulic-mining débris in the Sierra Nevada, by G. K. Gilbert. 154 pp., 34 pls. 1917. 50c.

Presents the results of an investigation undertaken by the United States Geological Survey in response to a memorial from the California Miners' Association asking that a particular study be made of portions of the Sacramento and San Joaquin valleys affected by detritus from torrential streams. The report deals largely with geologic and physiographic aspects of the subject, traces the physical effects, past and future, of the hydraulic mining of earlier decades, the similar effects which certain other industries induce through stimulation of the erosion of the soil, and the influence of the restriction of the area of inundation by the construction of levees. Suggests cooperation by several interests for the control of the streams now carrying heavy loads of débris.

BULLETINS.

An asterisk (*) indicates that the Geological Survey's stock of the paper is exhausted. Many of the papers so marked may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C.

*264. Record of deep-well drilling for 1904, by M. L. Fuller, E. F. Lines, and A. C. Veatch. 1905. 106 pp. 10c.

Discusses the importance of accurate well records to the driller, to owners of oil, gas, and water wells, and to the geologist; describes the general methods of work; gives tabulated records of wells in California, and detailed records of wells in Monterey and San Diego Counties, California. These wells were selected because they give definite stratigraphic information.

*298. Record of deep-well drilling for 1905, by M. L. Fuller and Samuel Sanford. 1906. 299 pp. 25c.

Gives an account of progress in the collection of well records and samples; contains tabulated records of wells in California; and detailed records of wells in Alameda, Fresno, Kern, Orange, San Luis Obispo, Santa Clara, Tulare, and Ventura Counties. The wells of which detailed sections are given were selected because they afford valuable stratigraphic information.

GEOLOGIC FOLIOS.

Under the plan adopted for the preparation of a geologic map of the United States the entire area is divided into small quadrangles, bounded by certain meridians and parallels, and these quadrangles, which number several thousand, are separately surveyed and mapped.[1] The unit of survey is also the unit of publication, and the maps and description of each quadrangle are issued in the form of a folio. When all the folios are completed they will constitute the Geologic Atlas of the United States.

A folio is designated by the name of the principal town or of a prominent natural feature within the quadrangle. Each folio includes maps showing the topography, geology, underground structure, and mineral deposits of the area mapped and several pages of descriptive text. The text explains the maps and describes the topographic and geologic features of the country and its mineral products. The topographic map shows roads, railroads, waterways, and, by contour lines, the shapes of the hills and valleys and the height above sea level of all points in the quadrangle. The areal-geology map shows the distribution of the various rocks at the surface. The structural-geology map shows the relations of the rocks to one another underground. The economic-geology map indicates the location of mineral deposits that are commercially valuable. The atresian-water map shows the depth to ground-water horizons. Economic-geology and artesian-water maps are included in folios if the conditions in the areas mapped warrant their publication. The folios are of special interest to students of geography and geology and are valuable as guides in the development and utilization on mineral resources.

[1] Index maps showing areas in California covered by topographic maps and by geologic folios will be mailed on receipt of request addressed to the Director, U. S. Geological Survey, Washington, D. C.

Digitized by Google

The folios numbered from 1 to 163, inclusive, are published in only one form (18 by 22 inches), called the library edition. Some of the folios that bear numbers higher than 163 are published also in an octavo edition (6 by 9 inches). Owing to a fire in the Geological Survey Building May 18, 1913, the stock of geologic folios was more or less damaged by fire and water, but many are usable, and will be sold at the uniform price of 5 cents each, with no reduction for wholesale orders. This rate applies to folios in stock from 1 to 184, inclusive, also to the library edition of folio 186. The library edition of folios 185, 187, and higher numbers sells for 25 cents a copy, except that some folios which contain an unusually large amount of matter sell for 50 cents a copy. The octavo edition of folio 185 and higher numbers sells for 50 cents a copy. If 34 folios selling at 25 cents each (or their equivalent in higher-priced folios) are ordered at one time a discount of 40 per cent is allowed; $5.10 is the minimum amount accepted at this rate.

All the folios contain descriptions of the drainage of the quadrangles. The folios in the following list contain also brief discussions of the underground waters in connection with the economic resources of the areas and more or less information concerning the utilization of the water resources.

An asterisk (*) indicates that the stock of the folio is exhausted.

*17. Marysville folio.
*39. Truckee folio.
*66. Colfax folio.
101. San Luis folio. 5c.
*138. Redding folio.
*163. Santa Cruz folio
193. San Francisco folio, 75c. in either edition.

MISCELLANEOUS REPORTS.

Other Federal bureaus and State and other organizations have from time to time published reports relating to the water resources of various sections of the country. Notable among those pertaining to the Pacific slope of California are the reports of the Chief of Engineers, U. S. Army, the State engineer and surveyor, the State conservation commission, and the State water commission.

The following reports deserve special mention:

Hall, W. H., Physical data and statistics of California, 1886.
Report of the Commissioner of Public Works to the Governor of California, 1895.
Report of the State Water Commission of California, 1912.

Digitized by Google

GEOLOGICAL SURVEY HYDROLOGIC REPORTS OF GENERAL INTEREST.

The following list comprises reports not readily classifiable by drainage basins and covering a wide range of hydrologic investigations.

WATER-SUPPLY PAPERS.

*1. Pumping water for irrigation, by H. M. Wilson. 1896. 57 pp., 9 pls.

Describes pumps and motive powers, windmills, water wheels, and various kinds of engines; also storage reservoirs to retain pumped water until needed for irrigation.

*3. Sewage irrigation, by G. W. Rafter. 1897. 100 pp., 4 pls. (See Water-Supply Paper 22.) 10c.

Discusses methods of sewage disposal by intermittent filtration and by irrigation; describes utilization of sewage in Germany, England, and France, and sewage purification in the United States.

*8. Windmills for irrigation, by E. C. Murphy. 1897. 49 pp., 8 pls. 10c.

Gives results of experimental tests of windmills during the summer of 1896 in the vicinity of Garden, Kansas; describes instruments and methods and draws conclusions.

*14. New tests of certain pumps and water lifts used in irrigation, by O. P. Hood. 1898. 91 pp., 1 pl.

Discusses efficiency of pumps and water lifts of various types.

*20. Experiments with windmills, by T. O. Perry. 1899. 97 pp., 12 pls. 15c.

Includes tables and descriptions of wind wheels, compares wheels of several types, and discusses results.

*22. Sewage irrigation, Part II, by G. W. Rafter. 1899. 100 pp., 7 pls. 15c.

Gives résumé of Water-Supply Paper No. 3; discusses pollution of certain streams, experiments on purification of factory wastes in Massachusetts, value of commercial fertilizers, and describes American sewage-disposal plants by States; contains bibliography of publications relating to sewage utilization and disposal.

*41. The windmill, its efficiency and economic use, Part I, by E. C. Murphy. 1901. 72 pp., 14 pls. 5c.

*42. The windmill, its efficiency and economic use, Part II, by E. C. Murphy. 1901. 75 pp. (73–147), 2 pls. (15–16). 10c.

Nos. 41 and 42 give details of results of experimental tests with windmills of various types.

*56. Methods of stream measurement. 1901. 51 pp., 12 pls. 15c.

Describes the methods used by the Survey in 1901–2. See also Nos. 64, 94, and 95.

*64. Accuracy of stream measurements, by E. C. Murphy. 1902. 99 pp., 4 pls. (See No. 95.) 10c.

Describes methods of measuring velocity of water and of measuring and computing stream flow, and compares results obtained with the different instruments and methods; describes also experiments and results at the Cornell University hydraulic laboratory. A second, enlarged, edition published as Water-Supply Paper 95.

*67. The motions of underground waters, by C. S. Slichter. 1902. 106 pp., 8 pls. 15c.

Discusses origin, depth, and amount of ground waters; permeability of rocks and porosity of soils; causes, rates, and laws of motions of ground water; surface and deep zones of flow; and recovery of waters by open wells and artesian and deep wells; treats of the shape and position of the water table; gives simple methods of measuring yield of flowing wells; describes artesian wells at Savannah, Ga.

Digitized by Google

72. Sewage pollution in the metropolitan area near New York City and its effect on inland water resources, by M. O. Leighton. 1902. 75 pp., 8 pls. 10c.

Defines "normal" and "polluted" waters and discusses the damage resulting from pollution.

*80. The relation of rainfall to run-off, by G. W. Rafter. 1903. 104 pp. 10c.

Treats of measurements of rainfall and laws and measurements of stream flow; gives rainfall, run-off, and evaporation formulas; discusses effect of forests on rainfall and run-off.

87. Irrigation in India (second edition), by H. M. Wilson. 1903. 238 pp., 27 pls. 25c.

First edition was published in Part II of the Twelfth Annual Report.

93. Proceedings of first conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer. 1904. 361 pp. 25c. [Requests for this report should be addressed to the U. S. Reclamation Service.]

Contains the following papers of more or less general interest:
Limits of an irrigation project, by D. W. Ross.
Relation of Federal and State laws to irrigation, by Morris Bien.
Electrical transmission of power for pumping, by H. A. Storrs.
Correct design and stability of high masonry dams, by Geo. Y. Wisner.
Irrigation surveys and the use of the plane table, by J. B. Lippincott.
The use of alkaline waters for irrigation, by Thomas H. Means.

*94. Hydrographic manual of the United States Geological Survey, prepared by E. C. Murphy, J. C. Hoyt, and G. B. Hollister. 1904. 76 pp., 3 pls. 10c.

Gives instruction for field and office work relating to measurements of stream flow by current meters. See also No. 95.

*95. Accuracy of stream measurements (second, enlarged edition), by E. C. Murphy. 1904. 169 pp., 6 pls.

Describes methods of measuring and computing stream flow and compares results derived from different instruments and methods. See also No. 94.

*103. A review of the laws forbidding pollution of inland waters in the United States, by E. B. Goodell. 1904. 120 pp. (See No. 152.)

Explains the legal principles under which antipollution statutes become operative, quotes court decisions to show authority for various deductions, and classifies according to scope the statutes enacted in the different States.

110. Contributions to the hydrology of eastern United States, 1904; M. L. Fuller, geologist in charge. 1905. 211 pp., 5 pls. 10c.

Contains the following reports of general interest. The scope of each paper is indicated by its title.

Description of underflow meter used in measuring the velocity and direction of underground water, by Charles S. Slichter.

The California or "stovepipe" method of well construction, by Charles S. Slichter.

Approximate methods of measuring the yield of flowing wells, by Charles S. Slichter.

Corrections necessary in accurate determinations of flow from vertical well casings, from notes furnished by A. N. Talbot.

Experiment relating to problems of well contamination at Quitman, Ga., by S. W. McCallie.

113. The disposal of strawboard and oil-well wastes, by R. L. Sackett and Isaiah Bowman. 1905. 52 pp., 4 pls. 5c.

The first paper discusses the pollution of streams by sewage and by trade wastes, describes the manufacture of strawboard, and gives results of various experiments in disposing of the waste. The second paper describes briefly the topography, drainage, and geology of the region about Marion, Ind., the contamination of rock wells and of streams by waste oil and brine.

*114. Underground waters of eastern United States; M. L. Fuller, geologist in charge. 1905. 285 pp., 18 pls. 25c.

Contains report on "Occurrence of underground waters," by M. L. Fuller, discussing sources, amount, and temperature of waters, permeability and storage capacity of rocks, water-bearing formations, recovery of water by springs, wells, and pumps, essential conditions of artesian flows, and general conditions affecting ground waters in eastern United States.

Digitized by Google

119. Index to the hydrographic progress reports of the United States Geological Survey, 1888 to 1903, by J. C. Hoyt and B. D. Wood. 1905. 253 pp. 15c.

120. Bibliographic review and index of papers relating to underground waters published by the United States Geological Survey, 1879–1904, by M. L. Fuller. 1905. 128 pp. 10c.

*122. Relation of the law to underground waters, by D. W. Johnson. 1905. 55 pp. 5c.

Defines and classifies underground waters, gives common-law rules relating to their use and cites State legislative acts affecting them.

143. Experiments on steel-concrete pipes on a working scale, by J. H. Quinton. 1905. 61 pp., 4 pls. 5c.

Scope indicated by title.

145. Contributions to the hydrology of eastern United States, 1905; M. L. Fuller, geologist in charge. 1905. 220 pp., 6 pls. 10c.

Contains brief reports of general interest as follows:

Drainage of ponds into drilled wells, by Robert E. Horton. Discusses efficiency, cost, and capacity of drainage wells and gives statistics of such wells in southern Michigan.

Construction of so-called fountain and geyser springs, by Myron L. Fuller.

A convenient gage for determining low artesian heads, by Myron L. Fuller.

146. Proceedings of second conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer. 1905. 267 pp. 15c. [Requests for this report should be addressed to the U. S. Reclamation Service.]

Contains the following papers (scope indicated by title) of more or less general interest:

Proposed State code of water laws, by Morris Bien.
Power engineering applied to irrigation problems, by O. H. Ensign.
Estimates on tunneling in irrigation projects, by A. L. Fellows.
Collection of stream-gaging data, by N. C. Grover.
Diamond-drill methods, by G. A. Hammond.
Mean-velocity and area curves, by F. W. Hanna.
Importance of general hydrographic data concerning basins of streams gaged, by R. E. Horton.
Effect of aquatic vegetation on stream flow, by R. E. Horton.
Sanitary regulations governing construction camps, by M. O. Leighton.
Necessity of draining irrigated land, by Thos. H. Means.
Alkali soils, by Thos. H. Means.
Cost of stream-gaging work, by E. C. Murphy.
Equipment of a cable gaging station, by E. C. Murphy.
Silting of reservoirs, by W. M. Reed.
Farm-unit classification by D. W. Ross.
Cost of power for pumping irrigating water, by H. A. Storrs.
Records of flow at current-meter gaging stations during the frozen season, by F. H. Tillinghast.

147. Destructive floods in United States in 1904, by E. C. Murphy and others. 1905, 206 pp., 18 pls. 15c.

Contains a brief account of "A method of computing cross-section area of waterways," including formulas for maximum discharge and area of cross section.

*150. Weir experiments, coefficients, and formulas, by R. E. Horton. 1906. 189 pp., 38 pls. (See Water-Supply Paper 200.) 15c.

151. Field assay of water, by M. O. Leighton. 1905. 77 pp., 4 pls.

Discusses methods, instruments, and reagents used in determining turbidity, color, iron, chlorides, and hardness in connection with the studies of the quality of water in various parts of the United States.

152. A review of the laws forbidding pollution of inland waters in the United States (second edition), by E. B. Goodell. 1905. 149 pp. 10c.

Digitized by Google

*155. Fluctuations of the water level in wells, with special reference to Long Island, N. Y., by A. C. Veatch. 1906. 83 pp., 9 pls. 25c.

Includes general discussion of fluctuation due to rainfall and evaporation, barometric changes, temperature changes, changes in rivers, changes in lake level, tidal changes, effects of settlement, irrigation, dams, ground-water developments, and to indeterminate causes.

*160. Underground-water papers, 1906; M. L. Fuller, geologist in charge. 1906. 104 pp., 1 pl.

Gives account of work in 1905; lists publications relating to underground waters, and contains the following brief reports of general interest:

Significance of the term "artesian," by Myron L. Fuller.
Representation of wells and springs on maps, by Myron L. Fuller.
Total amount of free water in the earth's crust, by Myron L. Fuller.
Use of fluorescein in the study of underground waters, by R. B. Dole.
Problems of water contamination, by Isaiah Bowman.
Instances of improvement of water in wells, by Myron L. Fuller.

*162. Destructive floods in the United States in 1905, with a discussion of flood discharge and frequency and an index to flood literature, by E. C. Murphy and others. 1906. 105 pp., 4 pls. 15c.

*163. Bibliographic review and index of underground-water literature published in the United States in 1905, by M. L. Fuller, F. G. Clapp, and B. L. Johnson. 1906. 130 pp. 15c.

Scope indicated by title.

*179. Prevention of stream pollution by distillery refuse, based on investigations at Lynchburg, Ohio, by Herman Stabler. 1906. 34 pp., 1 pl. 10c.

Describes grain distillation, treatment of slop, sources, character, and effects of effluents on streams; discusses filtration, precipitation, fermentation, and evaporation methods of disposal of wastes without pollution.

*180. Turbine water-wheel tests and power tables, by R. E. Horton. 1906. 134 pp., 2 pls. 20c.

Scope indicated by title.

*185. Investigations on the purification of Boston sewage, by C.-E. A. Winslow and E. B. Phelps. 1906. 163 pp. 25c.

Discusses composition, disposal, purification, and treatment of sewages and tendencies in sewage-disposal practice in England, Germany, and the United States; describes character of crude sewage at Boston, removal of suspended matter, treatment in septic tanks, and purification in intermittent sand filtration and coarse material; gives bibliography

*186. Stream pollution by acid-iron wastes, a report based on investigations made at Shelby, Ohio, by Herman Stabler. 1906. 36 pp., 1 pl.

Gives history of pollution by acid-iron wastes at Shelby, Ohio, and resulting litigation; discusses effect of acid-iron liquors on sewage purification processes, recovery of copper as from acid-iron wastes, and other processes for removal of pickling liquor.

*187. Determination of stream flow during the frozen season, by H. K. Barrows and R. E. Horton. 1907. 93 pp., 1 pl. 15c.

Scope indicated by title.

*189. The prevention of stream pollution by strawboard waste, by E. B. Phelps. 1906. 29 pp., 2 pls.

Describes manufacture of strawboard, present and proposed methods of disposal of waste liquors, laboratory investigations of precipitation and sedimentation, and field studies of amounts and character of water used, raw material and finished product, and mechanical filtration.

*194. Pollution of Illinois and Mississippi rivers by Chicago sewage (a digest of the testimony taken in the case of the State of Missouri *v.* The State of Illinois and the Sanitary District of Chicago), by M. O. Leighton. 1907. 369 pp., 2 pls.

Scope indicated by amplification of title.

Digitized by Google

*200. Weir experiments, coefficients, and formulas (revision of paper No. 150), by R. E. Horton. 1907. 195 pp., 38 pls. 35c.

Scope indicated by title.

*226. The pollution of streams by sulphite-pulp waste, a study of possible remedies, by E. B. Phelps. 1909. 37 pp., 1 pl. 10c.

Describes manufacture of sulphite pulp, the waste liquors, and the experimental work leading to suggestions as to methods of preventing stream pollution.

*229. The disinfection of sewage and sewage filter effluents, with a chapter on the putrescibility and stability of sewage effluents, by E. B. Phelps. 1909. 91 pp., 1 pl. 15c.

Scope indicated by title.

*234. Papers on the conservation of water resources. 1909. 96 pp., 2 pls. 15c.

Contains the following papers, whose scope is indicated by their titles: Distribution of rainfall, by Henry Gannett; Floods, by M. O. Leighton; Developed water powers, compiled under the direction of W. M. Steuart, with discussion by M. O. Leighton; Undeveloped water powers, by M. O. Leighton; Irrigation, by F. H. Newell; Underground waters, by W. C. Mendenhall; Denudation, by R. B. Dole and Herman Stabler; Control of catchment areas, by H. N. Parker.

*235. The purification of some textile and other factory wastes, by Herman Stables and G. H. Pratt. 1909. 76 pp. 10c.

Discusses waste waters from wool scouring, bleaching and dyeing cotton yarn, bleaching cotton piece goods, and manufacture of oleomargarine, fertilizer, and glue.

236. The quality of surface waters in the United States, Part I, Analyses of water east of the one hundredth meridian, by R. B. Dole. 1909. 123 pp. 10c.

Describes collection of samples, method of examination, preparation of solutions, accuracy of estimates, and expression of analytical results.

238. The public utility of water powers and their governmental regulation, by René Tavernier and M. O. Leighton. 1910. 161 pp. 15c.

Discusses hydraulic power and irrigation, French, Italian, and Swiss legislation relative to the development of water powers, and laws proposed in the French Parliament, reviews work of bureau of hydraulics and agricultural improvements of the French department of agriculture, and gives résumé of Federal and State water-power legislation in the United States.

*255. Underground waters for farm use, by M. L. Fuller. 1910. 58 pp., 17 pls. 15c.

Discusses rocks as sources of water supply and the relative safety of supplies from different materials; springs and their protection; open or dug and deep wells, their location, yield, relative cost, protection, and safety; advantages and disadvantages of cisterns and combination wells and cisterns.

*257. Well-drilling methods, by Isaiah Bowman. 1911. 139 pp., 4 pls. 15c.

Discusses amount, distribution, and disposal of rainfall, water-bearing rocks, amount of ground water, artesian conditions, and oil and gas bearing formations; gives history of well drilling in Asia, Europe, and the United States; describes in detail the various methods and the machinery used; discusses loss of tools and geologic difficulties, contamination of well waters and methods of prevention, tests of capacity and measurement of depth, and costs of sinking wells.

*258. Underground-water papers, 1910, by M. L. Fuller, F. G. Clapp, G. C. Matson, Samuel Sanford, and H. C. Wolff. 1911. 123 pp., 2 pls. 15c.

Contains the following papers (scope indicated by titles) of general interest:
Drainage by wells, by M. L. Fuller.
Freezing of wells and related phenomena, by M. L. Fuller.
Pollution of underground waters in limestone, by G. C. Matson.
Protection of shallow wells in sandy deposits, by M. L. Fuller.
Magnetic wells, by M. L. Fuller.

274. Some stream waters of the western United States, with chapters on sediment carried by the Rio Grande and the industrial application of water analyses, by Herman Stabler. 1911. 188 pp. 15c.

Describes collection of samples, plan of analytical work, and methods of analyses; discusses soap-consuming power of waters, water softening, boiler waters, and water for irrigation; gives results of analyses of waters of the Rio Grande and of Pecos, Gallinas, and Hondo rivers.

Digitized by Google

*315. The purification of public water supplies, by G. A. Johnson. 1913. 84 pp., 8 pls. 10c.

Discusses ground, lake, and river waters as public supplies, development of waterworks systems in the United States, water consumption, and typhoid fever; describes methods of filtration and sterilization of water, and municipal water softening.

334. The Ohio Valley flood of March-April, 1913 (including comparisons with some earlier floods), by A. H. Horton and H. J. Jackson. 1913. 96 pp., 22 pls. 20c.

Although relating specifically to floods in the Ohio Valley, this report discusses also the causes of floods and the prevention of damage by floods.

337. The effects of ice on stream flow, by William Glenn Hoyt. 1913. 77 pp., 7 pls. 15c.

Discusses methods of measuring the winter flow of streams.

*345. Contributions to the hydrology of the United States, 1914. N. C. Grover, chief hydraulic engineer. 1915. 225 pp., 17 pls. 30c. Contains:

*(c) A method of determining the daily discharge of rivers of variable slope, by M. R. Hall, W. E. Hall, and C. H. Pierce, pp. 53–65.

364. Water analyses from the laboratory of the United States Geological Survey, tabulated by F. W. Clarke, chief chemist. 1914. 40 pp. 5c.

Contains analyses of waters from rivers, lakes, wells, and springs in various parts of the United States, including analyses of the geyser water of Yellowstone National Park, hot springs in Montana, brines from Death Valley, water from the Gulf of Mexico, and mine waters from Tennessee, Michigan, Missouri and Oklahoma, Montana, Colorado and Utah, Nevada and Arizona, and California.

371. Equipment for current-meter gaging stations, by G. J. Lyon. 1915. 64 pp., 37 pls. 20c.

Describes methods of installing automatic and other gages and of constructing gage wells, shelters, and structures for making discharge measurements and artificial controls.

*375. Contributions to the hydrology of the United States, 1915. N. C. Grover, chief hydraulic engineer. 1916. 181 pp., 9 pls. 15c. Contains:

*(c) The relation of stream gaging to the science of hydraulics, by C. H. Pierce and R. W. Davenport, pp. 77–84.

(e) A method of correcting river discharge for a changing stage, by B. E. Jones, pp. 117–130.

(f) Conditions requiring the use of automatic gages in obtaining records of stream flow, by C. H. Pierce, pp. 131–139.

Papers presented at the conference of engineers of the water-resources branch in December, 1914.

*400. Contributions to the hydrology of the United States, 1916. N. C. Grover, chief hydraulic engineer. 1917. 108 pp., 7 pls. Contains:

(a) The people's interest in water-power resources, by G. O. Smith, pp. 1–8.

*(c) The measurement of silt-laden streams, by R. C. Pierce, pp. 39–51.

(d) Accuracy of stream-flow data, by N. C. Grover and J. C. Hoyt, pp. 53–59.

416. The divining rod, a history of water witching, with a bibliography, by A. J. Ellis. 1917. 59 pp. 10c.

A brief paper published "merely to furnish a reply to the numerous inquiries that are continually being received from all parts of the country" as to the efficacy of the divining rod for locating underground water.

425. Contributions to the hydrology of the United States, 1917. N. C. Grover, chief hydraulic engineer. 1918. Contains:

*(c) Hydraulic conversion tables and convenient equivalents, pp. 71–94. 1917.

Digitized by Google

ANNUAL REPORTS.

*Fifth Annual Report of the United States Geological Survey, 1883–84, J. W. Powell, Director. 1885. xxxvi, 469 pp., 58 pls. $2.25. Contains:

*The requisite and qualifying conditions of artesian wells, by T. C. Chamberlin, pp. 125–173, pl. 21. Scope indicated by title.

Twelfth Annual Report of the United States Geological Survey, 1890–91, J. W. Powell, Director. 1891. 2 parts. Pt. II, Irrigation, xviii, 576 pp., 93 pls. $2. Contains:

*Irrigation in India, by H. M. Wilson, pp. 363–561, pls. 107–146. See Water-Supply Paper 87.

Thirteenth Annual Report of the United States Geological Survey, 1891–92, J. W. Powell, Director. 1892. (Pts. II and III, 1893.) 3 parts. *Pt. III, Irrigation, xi, 486 pp., 77 pls. $1.85. Contains:

*American irrigation engineering, by H. M. Wilson, pp. 101–349, pls. 111–146. Discusses the economic aspects of irrigation, alkaline drainage, silt and sedimentation; gives brief history of legislation; describes perennial canals in Idaho, California, Wyoming, and Arizona; discusses water storage at reservoirs of the California and other projects, subsurface sources of supply, pumping, and subirrigation.

Fourteenth Annual Report of the United States Geological Survey, 1892–93, J. W. Powell, Director. 1893. (Pt. II, 1894.) 2 parts. *Pt. II, Accompanying papers, xx, 597 pp., 73 pls. $2.10. Contains:

*The potable waters of the eastern United States, by W. J. McGee, pp. 1–47. Discusses cistern water, stream waters, and ground waters, including mineral springs and artesian wells.

*Natural mineral waters of the United States, by A. C. Peale, pp. 49–88, pls. 3 and 4. Discusses the origin and flow of mineral springs, the source of mineralization, thermal springs, the chemical composition and analysis of spring waters, geographic distribution, and the utilization of mineral waters; gives a list of American mineral-spring resorts; contains also some analyses.

Nineteenth Annual Report of the United States Geological Survey, 1897–98, Charles D. Walcott, Director. 1898. (Parts II, III, and V, 1899.) 6 parts in 7 vols. and separate case for maps with Pt. V. *Pt. II, Papers chiefly of a theoretic nature, v, 958 pp., 172 pls. $2.65. Contains:

*Principles and conditions of the movements of ground water, by F. H. King, pp. 59–294, pls. 6–16. Discusses the amount of water stored in sandstone, in soil, and in other rocks, the depth to which ground water penetrates; gravitational, thermal, and capillary movements of ground waters, and the configuration of the ground-water surface; gives the results of experimental investigations on the flow of air and water through a rigid, porous media, and through sand, sandstones, and silts; discusses results obtained by other investigators, and summarizes results of observations; discusses also rate of flow of water through sand and rock, the growth of rivers, rate of filtration through soil, interference of wells, etc.

*Theoretical investigation of the motion of ground waters, by C. S. Slichter, pp. 295–384, pl. 17. Scope indicated by title.

PROFESSIONAL PAPERS.

*72. Denudation and erosion in the southern Appalachian region and the Monongahela basin, by L. C. Glenn. 1911. 137 pp., 21 pls. 35c.

Describes the topography, geology, drainage, forests, climate, population, and transportation facilities of the region, the relation of agriculture, lumbering, mining, and power development to erosion and denudation, and the nature, effects, and remedies of erosion; gives details of conditions in Holston, Nolichucky, French Broad, Little Tennessee, and Hiwassee River basins, along Tennessee River proper, and in the basins of the Coosa-Alabama system, Chattahoochee, Savannah, Saluda, Broad, Catawba, Yadkin, New, and Monongahela rivers.

Digitized by Google

86. The transportation of débris by running water, by G. K. Gilbert, based on experiments made with the assistance of E. C. Murphy. 1914. 263 pp., 3 pls. 70c.

The results of an investigation which was carried on in a specially equipped laboratory a Berkeley, Cal., and was undertaken for the purpose of learning "the laws which control the movement of bed load and especially to determine how the quantity of load is related to the stream slope and discharge and to the degree of comminution of the débris."

A highly technical report.

105. Hydraulic-mining débris in the Sierra Nevada, by G. K. Gilbert. 154 pp., 34 pls. 1917. 50c.

Presents the results of an investigation undertaken by the United States Geological Survey in response to a memorial from the California Miners' Association asking that a particular study be made of portions of the Sacramento and San Joaquin valleys affected by detritus from torrential streams. The report deals largely with geologic and physiographic aspects of the subject, traces the physical effects, past and future, of the hydraulic mining of earlier decades, the similar effects which certain other industries induce through stimulation of the erosion of the soil, and the influence of the restriction of the area of inundation by the construction of levees. Suggests cooperation by several interests for the control of the streams now carrying heavy loads of débris.

BULLETINS.

*32. Lists and analyses of the mineral springs of the United States (a preliminary study), by A. C. Peale. 1886. 235 pp.

Defines mineral waters, lists the springs by States, and gives tables of available analyses.

*319. Summary of the controlling factors of artesian flows, by Myron L. Fuller. 44 pp. 1908. 10c.

Describes underground reservoirs, the sources of underground waters, the confining agents, the primary and modifying factors of artesian circulation, the essential and modifying factors of artesian flow, and typical artesian systems.

*479. The geochemical interpretation of water analyses, by Chase Palmer. 1911. 31 pp. 5c.

Discusses the expression of chemical analyses, the chemical character of water and the properties of natural waters; gives a classification of waters based on property values and reacting values, and discusses the character of the waters of certain rivers as interpreted directly from the results of analyses; discusses also the relation of water properties to geologic formations, silica in river water, and the character of the water of the Mississippi and the Great Lakes and St. Lawrence River as indicated by chemical analyses.

Digitized by Google

INDEX BY AREAS AND SUBJECTS.

A=Annual Reports; M=Monograph; B=Bulletin; P=Professional Paper; W=Water-Supply Paper; GF=Geologic Folio.]

Artesian waters: Essential conditions ..... A 5; B 319; W 44, 67, 114
Bibliographies [1] ..... W 119, 120, 163, 280
California: Irrigation ..... A 10 ii, 11 ii, 12 ii; W 17, 18, 19, 43, 45, 46, 86, 89, 137, 138, 139, 146, 219, 375*a*, 400*e*, G F 138
Quality of waters ..... W 116, 142, 237, 274, 338, 364, 398
Surface waters ..... A 12 ii, 13 iii, 16 ii, 18 iv; W 45, 46, 58, 81, 86, 116, 142, 147, 162, 237, 274, 295, 296, 297, 298, 299, 300, 426
Underground waters ..... A 16 ii; B 264, 298; W 45, 59, 60, 89, 112, 137, 138, 139, 140, 142, 146, 213, 219, 222, 251, 338, 345*h*, 375*a*, 398, 400*e*; G F 17, 39, 66, 101, 138, 163, 193
Chemical analyses: [2] Methods and interpretation .. W 151, 236, 259, 274, 364; B 479
Conservation ..... W 234, 400*a*
Débris reports ..... P 86, 105
Denudation ..... P 72
Divining rod ..... W 416
Engineering methods ..... P 86; W 1, 3, 8, 20, 41, 42, 43, 56, 64, 94, 95, 110, 143, 150, 180, 187, 200, 257, 337, 345*e*, 371, 375*c*, 400*c* and *d*, 425*c*
Floods ..... W 147, 162, 334
India: Irrigation ..... A 12 ii; W 87
Ice measurements ..... W 187, 337
Irrigation, general ..... A 10 ii, 11 ii, 12 ii, 13 iii, 16 ii; W 20, 22, 41, 42, 87
Legal aspects: Surface waters ..... W 103, 152, 238
Underground waters ..... W 122
Mineral springs: Analyses ..... A 14 ii; B 32
Origin, distribution, etc ..... A 14 ii
Lists ..... B 32; W 114
Motions of ground waters ..... A 19 ii; B 319; W 67, 110, 140, 155
Pollution: By industrial wastes ..... W 179, 186, 189, 226, 235
By sewage ..... W 72, 194
Laws forbidding ..... W 103, 152
Indices of ..... W 144, 160
Profiles of rivers ..... W 44, 115
Sanitation; quality of waters; pollution; sewage irrigation ..... W 3, 22, 72, 103, 110, 113, 114, 144, 145, 152, 160, 179, 185, 186, 189, 194, 226, 229, 235, 236, 255, 258, 315
Sewage disposal and purification ..... W 3, 22, 72, 113, 185, 194, 229
Underground waters: Legal aspects ..... W 122
Methods of utilization ..... W 114, 255, 257, 258
Pollution ..... W 110, 145, 160, 258
Windmill papers ..... W 1, 8, 20, 41, 42

[1] Many of the reports contain brief subject bibliographies. See abstracts.

[2] Many analyses of river, spring, and well waters are scattered through publications as noted in abstracts.

Digitized by Google

INDEX OF STREAMS.

	Page.
"A" canal, Oreg	xiv
Alameda Creek, Cal	ix
Agua Caliente Creek, Cal	viii
American River, Cal	xiii
American River, Middle Fork, Cal.	xiii
American River, North Fork, Cal.	xiii
American River, South Fork, Cal.	xiii
Anna Creek, Oreg	xiv
Arroyo Seco (tributary to Los Angeles River), Cal	viii
Arroyo Seco (tributary to Salinas River), Cal	ix
Ash Creek, Cal	xii
Basin Creek, Cal	ix
Bear Creek (tributary to Sacramento River), Cal	xii
Bear Creek (tributary to San Joaquin River), Cal	x
Bear Creek (Tule River basin), Cal	x
Bear River, Cal	xiii
Bear River canal, Cal	xiii
Big Creek (tributary to North Fork of Kings River), Cal	x
Big Creek (tributary to San Joaquin River), Cal	x
Big Creek (tributary to South Fork of Merced River), Cal	x
Black Canyon Creek, Cal	vii
Boulder Creek, Cal	vii
Burney Creek, Cal	xii
Butt Creek, Cal	xii
Cache Creek, Cal	xiii
Calaveras River, Cal	xi
Caliente Creek, Cal	ix
Canada Verde Creek, Cal	viii
Carrizo Creek, Cal	viii
Cascadel Creek, Cal	x
Cherry Creek, Cal	xi
Chowchilla Creek, Cal	x
Clavey River, Cal	xi
Clear Creek, Cal	xii
Clear Lake, Cal	xiii
Clover Creek, Cal	xii
Coffee Creek, Cal	xv
Coldwater Creek (tributary to Temescal Creek), Cal	viii
Coldwater Creek (tributary to San Gabriel River), Cal	
Corral Creek, Cal	xi
Cosumnes River, Cal	xi
Cosumnes River, North Fork, Cal.	xi
Cottonwood Creek (tributary to Tia Juana River), Cal	vii
Cottonwood Creek, Oreg	xii
Cottonwood Creek, North Fork, Cal	xii
Cow Creek, Cal	xii
Cow Creek, Little, Cal	xii
Coyote River, Cal	ix
Crane Valley reservoir, Cal	x
Deer Creek (tributary to Tulare Lake), Cal	ix
Deer Creek (tributary to Sacramento River), Cal	xii
Devil Canyon Creek, Cal	viii
Dinkey Creek, Cal	x
Dog Creek, Oreg	xii
Drews Creek, Oreg	xii
Dry Creek, Cal	xi
Dulzura conduit, Cal	vii
East Fork. *See name of main stream*	
East San Pasqual ditch, Cal	viii
Eel River, Cal	xiv
Eel River, Middle, Cal	xiv
Eel River, South, Cal	xiv
Eel River, South Fork, Cal	xiv
Eleanor Creek, Cal	xi
Eleanor Lake	xi
Erskine Creek, Cal	ix
Escondido Mutual Water Co.'s canal, Cal	viii
Fall River, Cal	xii
Feather River, Cal	xii
Feather River, Middle Fork, Cal.	xiii
Feather River, North Fork, Cal.	xii
Feather River, South Fork, Cal.	xiii
Fish Fork of San Gabriel River, Cal	viii

Digitized by Google

	Page.
Fourmile Creek, Oreg	XIV
Fresno River, Cal	X
Fresno River, North Fork, Cal	X
"G" canal, Oreg	XIV
Gato Creek, Cal	IX
Gerle Creek, Cal	XIII
Golden Rock ditch, Cal	XI
Goodyear Creek, Cal	XIII
Goose Lake basin, Oreg	XII
Griffith lateral at Lost River dam	XIV
Grizzly Creek, Cal	XIII
Guejito Creek, Cal	VIII
Hamilton Branch, Cal	XII
Hat Creek, Cal	XII
Highlands (North Fork) canal, Cal	VIII
Hunter Creek, Cal	XI
Illilouette Creek, Cal	X
Indian Creek (tributary to Clavey River), Cal	XI
Indian Creek (tributary to Feather River), Cal	XII
Indian Creek (tributary to Klamath River), Cal	XV
Iron Fork of San Gabriel River, Cal	VIII
Jawbone Creek, Cal	XI
Kaweah River, Cal	X
Kaweah River, East Fork	X
Kaweah River, Marble Fork	X
Kaweah River, Middle Fork	X
Kaweah River, North Fork, Cal	X
Kaweah River, South Fork, Cal	X
Kern River, Cal	IX
Kern River Power Co.'s canal, Cal	IX
Kern River, South Fork, Cal	IX
Kings River, Cal	X
Klamath Lake, Lower, Oreg	XV
Klamath Lake, Upper, Oreg	XIV
Klamath River, Cal., Oreg	XIV
Knight Creek, Cal	XI
Kosk Creek, Cal	XII
La Grange Water & Power Co.'s canal, Cal	XI
Licking Fork of Mokelumne River, Cal	XI
Link River, Oreg	XIV
Little Cow Creek, Cal	XII
Little Rubicon River, Cal	XIII
Little South Fork of Rubicon River, Cal	XIII
Little South Fork ditch, Cal	XIII
Little Stony Creek, Cal	XII
Loma Abajo River, Cal	IX
Los Angeles River, Cal	VIII
Lost River, Cal., Oreg	XIV
Lost River diversion canal, Oreg	XIV
Lower Klamath Lake, Cal	XV
Lytle Creek, Cal	VIII
Mad River, Cal	XIV
Malibu Creek, Cal	IX
Marble Fork of Kaweah River, Cal	X
Mariposa Creek, Cal	X
Matagual Creek, Cal	VIII
Mattole River, Cal	XIII
McCloud River, Cal	XII
Mentone Power Co.'s canal, Cal. *See* Santa Ana River	
Merced River, Cal	X
Merced River, South Fork, Cal	X
Middle Eel River, Cal	XIV
Middle Fork. *See name of main stream*	
Mill Creek (tributary to Santa Ana River), Cal	VIII
Mill Creek (tributary to Sacramento River), Cal	XII
Miller Creek (tributary to Klamath River), Oreg	XIV
Miller Creek (tributary to Lost River), Oreg	XIV
Modesto canal, Cal	XI
Modoc Point canal, Oreg	XIV
Mokelumne River, Cal	XI
Mokelumne River, Licking Fork, Cal	XI
Mokelumne River, Middle Fork, Cal	XI
Mokelumne River, South Fork, Cal	XI
Mono Creek, Cal	IX
Montgomery Creek, Cal	XII
Nacimiento Creek, Cal	IX
Nelder Creek, Cal	X
North Branch or North Fork. *See name of main stream*	
North Drews canal, Cal	XII
North Fork creek, Cal	X
Oakdale canal, Cal	XI
Olene wasteway, Oreg	XIV
Oregon Creek, Cal	XIII
Pacific Light & Power Corporation's canals, Cal	VIII
Pajaro River, Cal	IX
Pala Indian Reservation canal, Cal	VIII
Palermo Land & Water Co.'s canal, Cal	XIII

Digitized by Google

	Page.
Pilot Creek, Cal	XIII
Pilot Creek ditch, Cal	XIII
Pine Valley Creek, Cal	VII
Piru Creek, Cal	IX
Pit River, Cal	XII
Pit River, South Fork, Cal	XII
Pitman Creek, Cal	X
Poso Creek, Cal	IX
Putah Creek, Cal	XIII
Redlands (South Fork) canal, Cal.	VIII
Redwood Creek, Cal	XIV
Reeve Davis flume, Cal	XV
Relief Creek, Cal	XI
Relief reservoir, Cal	XI
Rincon Indian Reservation ditch, Cal	VIII
Rising River, Cal	XII
Rock Creek, Cal	XIII
Rose Creek, Cal	XI
Rubicon River, Cal	XIII
Rubicon River, Little, Cal	XIII
Rubicon River, Little South Fork, Cal	XIII
Rush Creek, Cal	X
Russian River, Cal	XIII
Russian River, East Fork, Cal	XIII
Sacramento River, Cal	XII
Salinas River, Cal	IX
Salmon River, Cal	XV
San Antonio Creek, Cal	VIII
San Antonio River, Cal	IX
San Diego flume, Cal	VII
San Diego River, Cal	VII
San Diego River, South Fork, Cal.	VII
San Dieguito River, Cal	VII
San Emigdio Creek, Cal	IX
San Gabriel River and canals, Cal.	VIII
San Gabriel River, Fish Fork, Cal.	VIII
San Gabriel River, Iron Fork, Cal.	VIII
San Gabriel River, North Branch of North Fork, Cal	VIII
San Gabriel River, West Branch of North Fork, Cal	VIII
San Gabriel River, West Fork, Cal.	VIII
San Joaquin River, Cal	X
San Jose Creek, Cal	IX
San Lorenzo Creek, Cal	IX
San Luis Rey ditch, Cal	VIII
San Luis Rey River, Cal	VIII
San Luis Rey River, West Fork, Cal	VIII
San Pasqual ditch, East, Cal	VIII
San Pasqual ditch, West, Cal	VIII
San Roque Creek, Cal	IX
San Vincente Creek, Cal	VII
Santa Ana River and power canal, Cal	VIII
Santa Clara River, Cal	IX
Santa Maria Creek, Cal	VIII
Santa Maria River, Cal	IX
Santa Paula Creek, Cal	IX
Santa Ynez River, Cal	IX
Santa Ysabel Creek, Cal	VII
Scott River, Cal	XV
Scott River, East Fork, Cal	XV
Seco, Arroyo (tributary to Los Angeles River), Cal	VIII
Seco, Arroyo (tributary to Salinas River), Cal	IX
Sespe Creek, Cal	IX
Shasta River, Cal	XV
Sly Park Creek, Cal	XI
Smith River, Middle Fork, Cal	XV
Smith River, North Fork, Cal	XV
Smith River, South Fork, Cal	XV
South Eel River, Cal	XIV
South Fork Creek, Cal	X
South Fork ditch, Cal	X
South Fork ditch, Little, Cal	
South Fork flume, Cal	VII
South Fork, Cal. *See name of main stream*	
South San Joaquin canal, Cal	XI
Spanish Creek, Cal	XII
Sprague River, Oreg	XIV
Spring Valley aqueduct, Cal	IX
Squaw Creek, Cal	XII
Stanislaus River, Cal	XI
Stanislaus River, Middle Fork, Cal.	XI
Stanislaus River, North Fork, Cal.	XI
Stanislaus River, South Fork, Cal.	XI
Stanislaus & San Joaquin Water Co.'s canal, Cal	XI
Stony Creek, Cal	XII
Stony Creek, Little, Cal	XII
Susanna Creek, Cal	VIII
Sweetwater River, Cal	VII
Swift Creek, Cal	XV
Sycan River, Oreg	XIV
Tejon House Creek, Cal	IX
Temecula Creek, Cal	VIII
Temescal Creek (tributary to San Dieguito River), Cal	VII
Temescal Creek (tributary to Santa Ana River), Cal	VIII
Tenaya Creek, Cal	XII
Thomas Creek, Oreg	VII

Digitized by Google

	Page.
Tia Juana River, Cal	VII
Trinity River, Cal	XV
Trinity River, East Fork, Cal	XV
Trinity River, North Fork, Cal	XV
Trinity River, South Fork, Cal	XV
Triunfo Creek, Cal	IX
Tulare Lake, Cal	IX
Tule Lake, Oreg	XIV
Tule River, Cal	IX, X
Tule River, North Fork of Middle Fork, Cal	IX
Tule River, South Fork of Middle Fork, Cal	X
Tule River, South Fork, Cal	X
Tuolumne River, Cal	XI
Tuolumne River, North Fork, Cal.	XI
Tuolumne River, South Fork, Cal.	XI
Turlock canal, Cal	XI
Tyler Creek, Cal	IX
Upper Klamath Lake, Oreg	XIV
Utica Gold Mining Co.'s canal, Cal.	XI
Van Duzen River, Cal	XIV
Ventura River, Cal	IX
Waterman Canyon Creek, Cal	VIII
West Fork or Branch. *See name of main stream.*	
West San Pasqual ditch, Cal	VIII
West Valley Creek, Cal	XII
Whiskey Creek, Cal	X
White River, Cal	IX
Williamson River, Oreg	XIV
Wood River, Oreg	XIV
Yager Creek, Cal	XIV
Yosemite Creek, Cal	X
Yosemite Water & Power Co.'s canal. *See* La Grange Water & Power Co.'s canal.	
Yuba River, Cal	XIII
Yuba River, Middle Fork, Cal	XIII
Yuba River, North Fork, Cal	XIII
Yuba River, North Fork of North Fork, Cal	XIII

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

CECIL H. GREEN LIBRARY
STANFORD UNIVERSITY LIBRARIES
STANFORD, CALIFORNIA 94305-6004
(650) 723-1493
grncirc@sulmail.stanford.edu
All books are subject to recall.

DATE DUE

Digitized by Google

Digitized by Google